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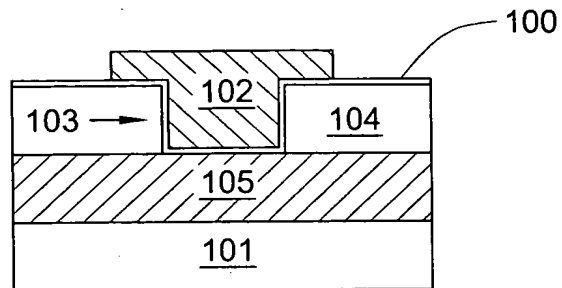


FIG. 1

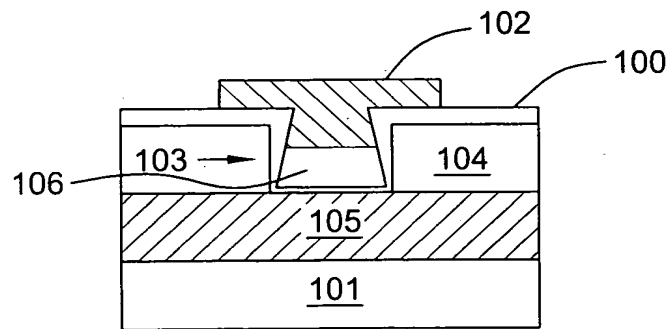


FIG. 2

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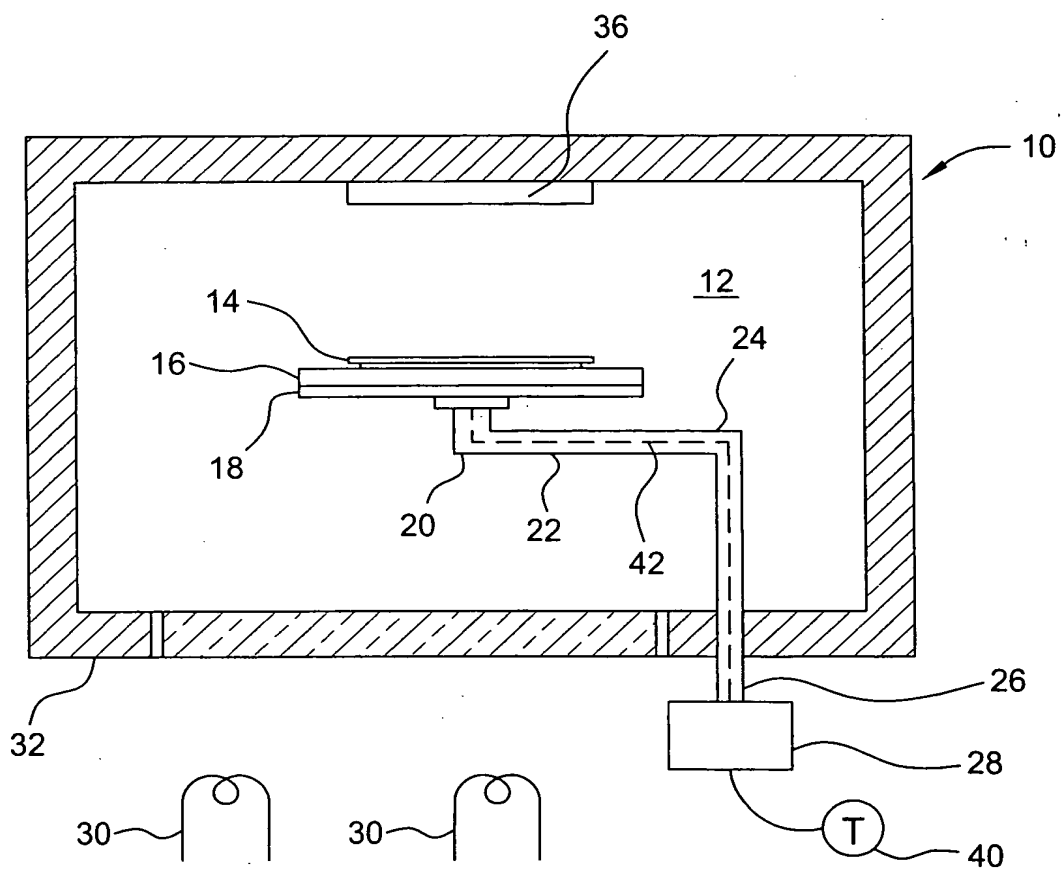
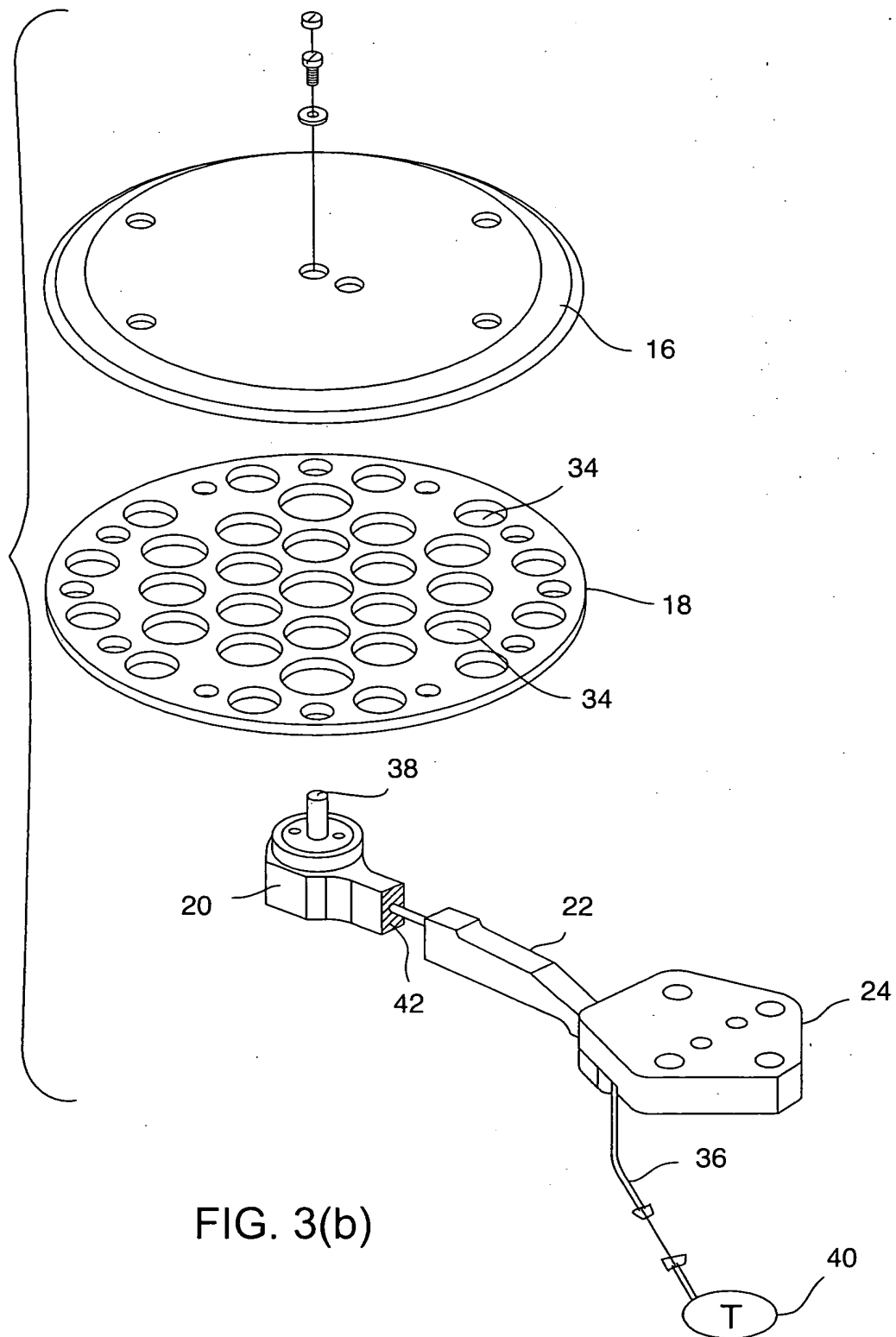


FIG. 3(a)

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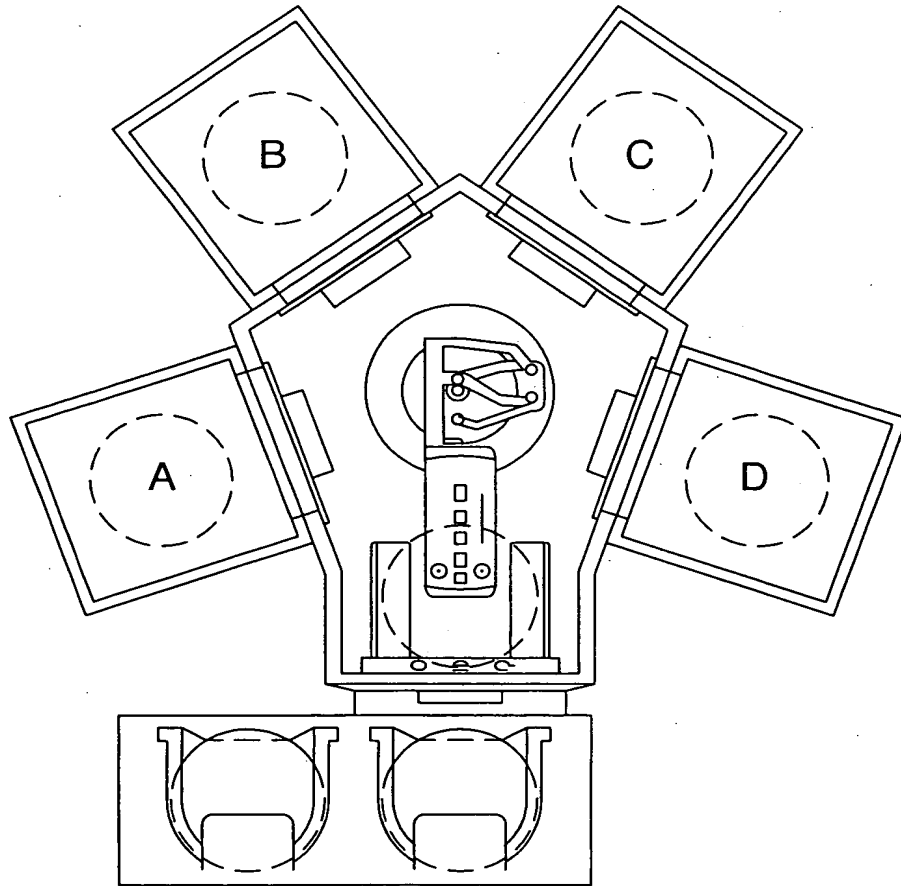
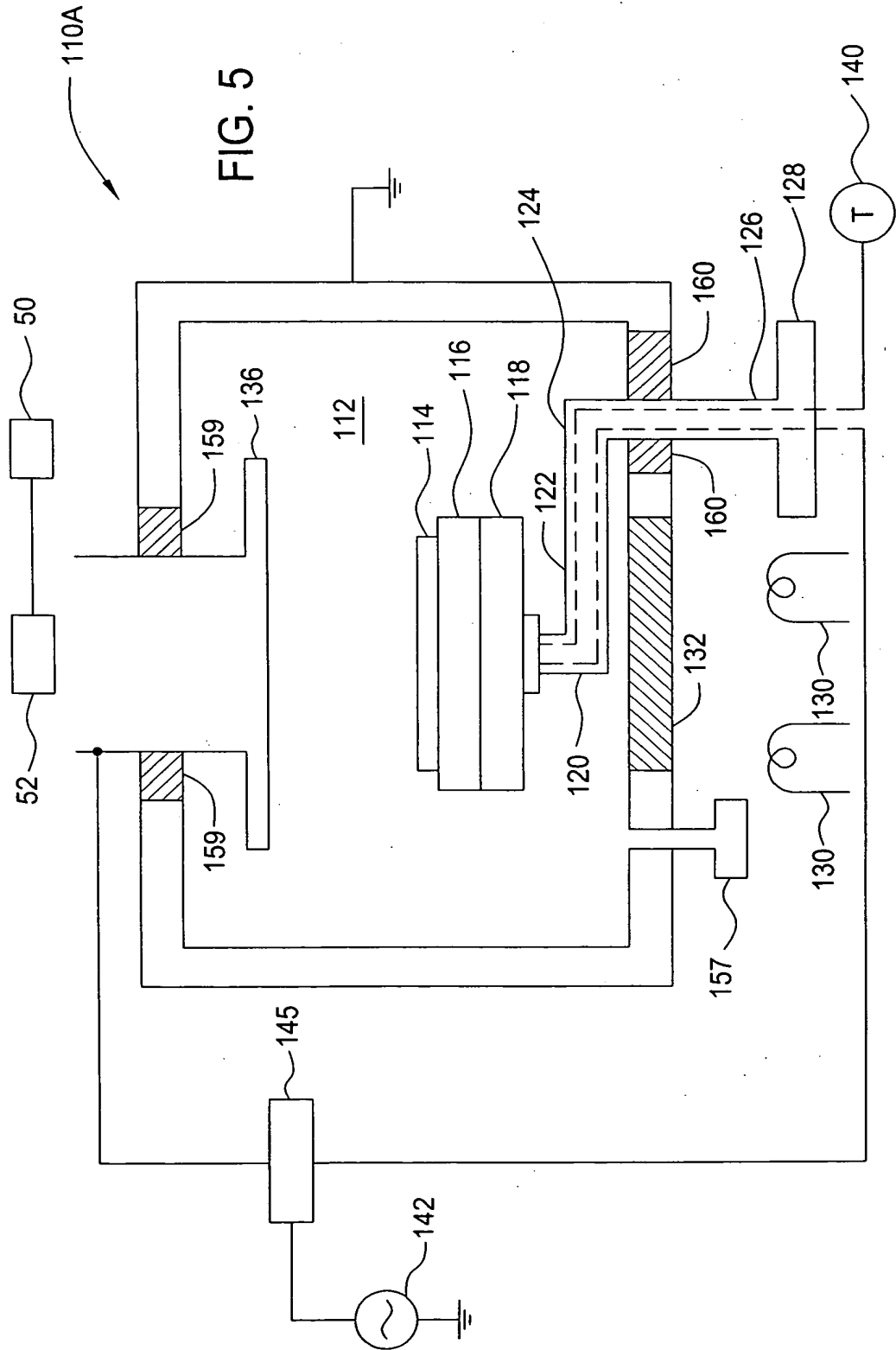


FIG. 4

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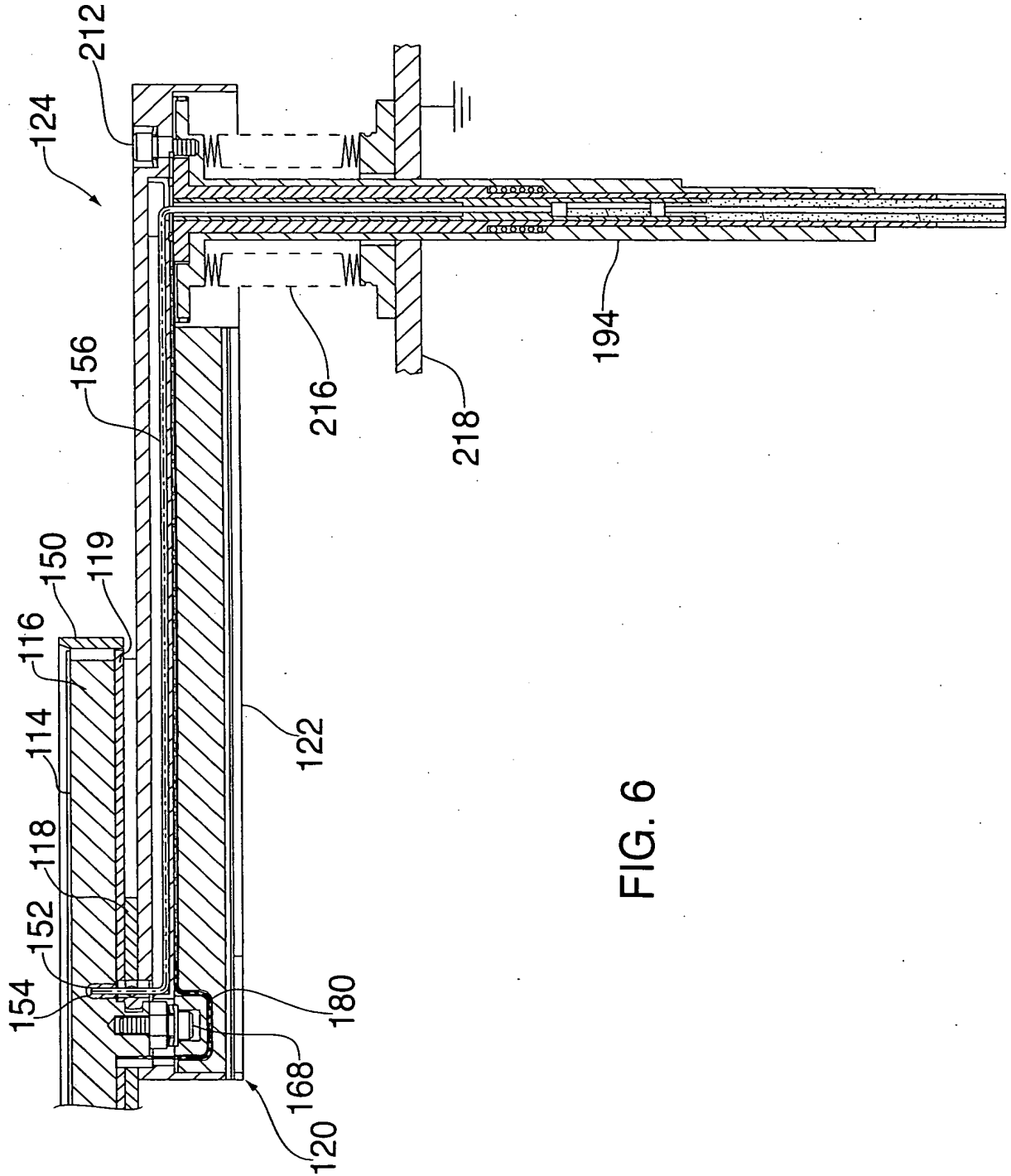


FIG. 6

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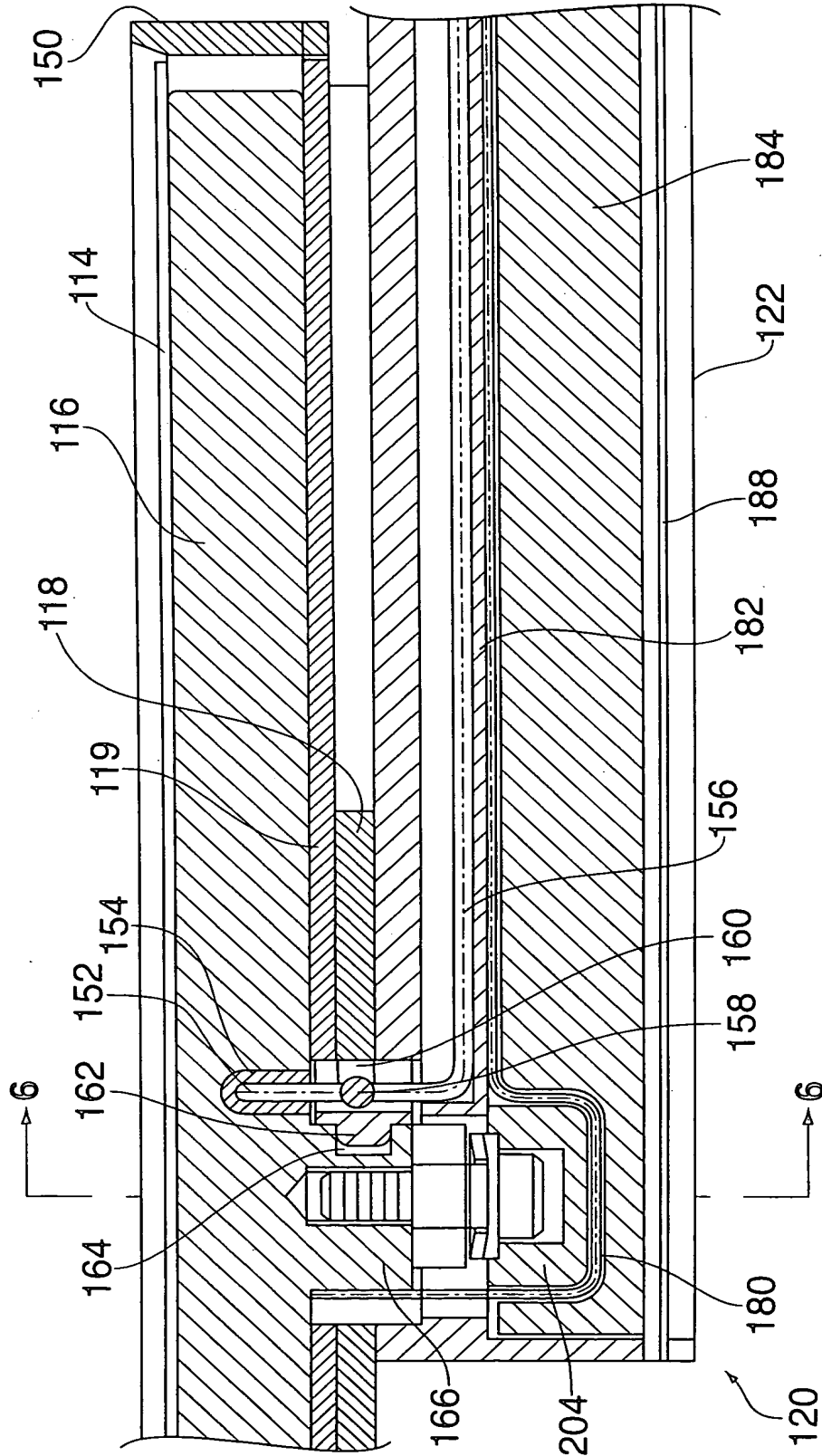


FIG. 7

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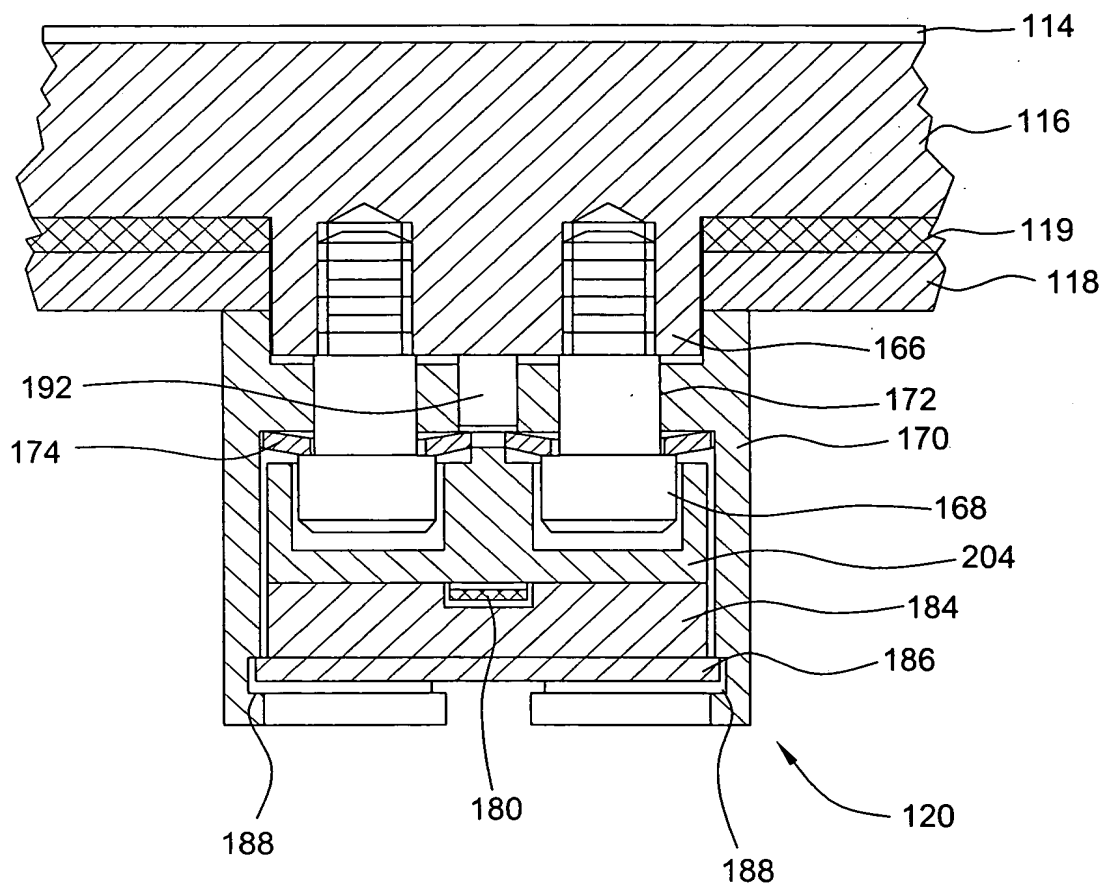
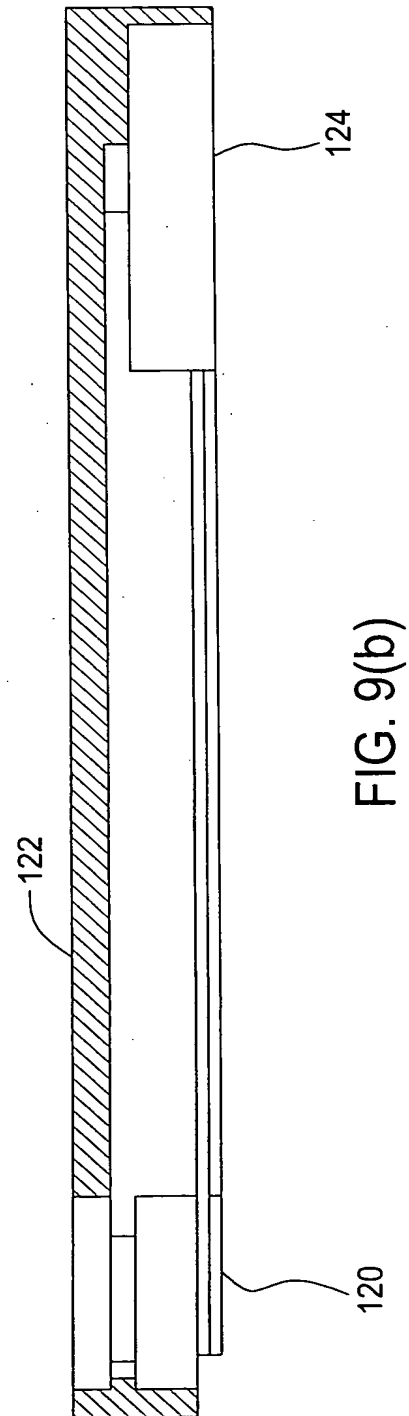
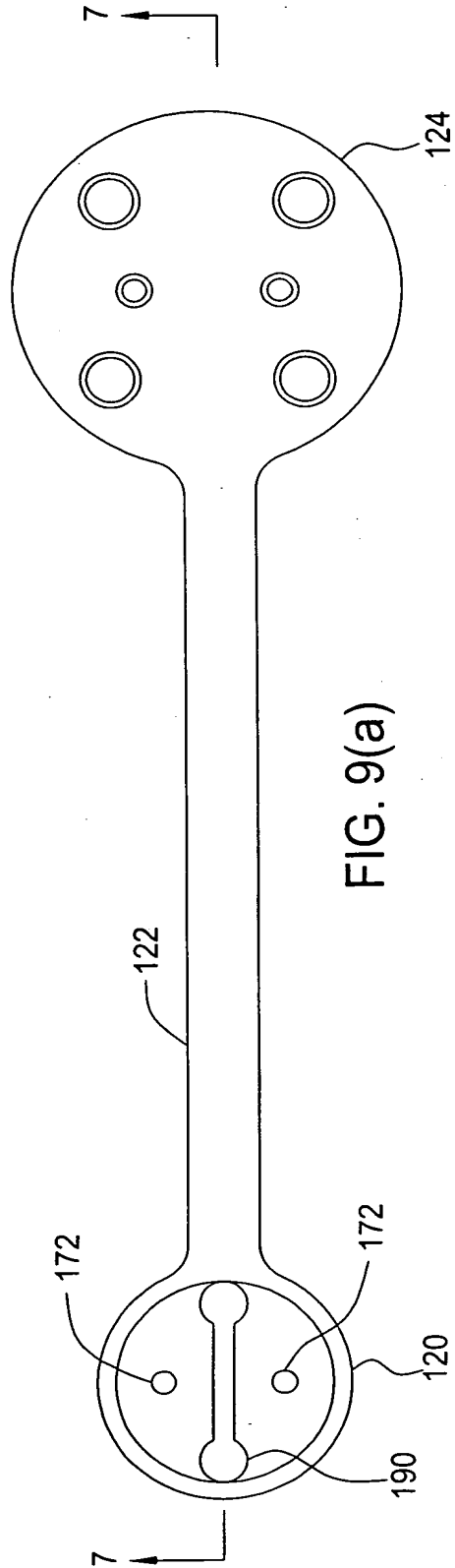


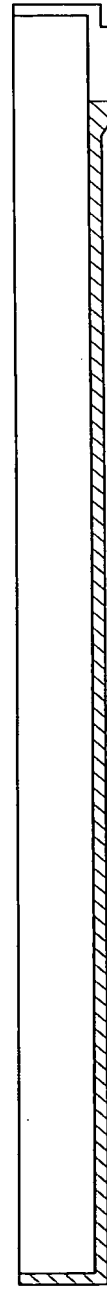
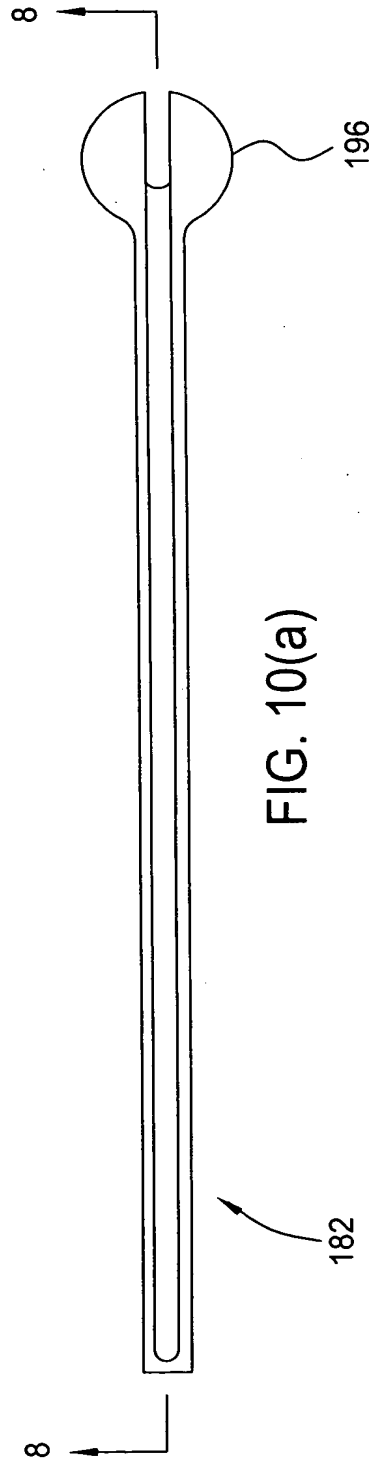
FIG. 8



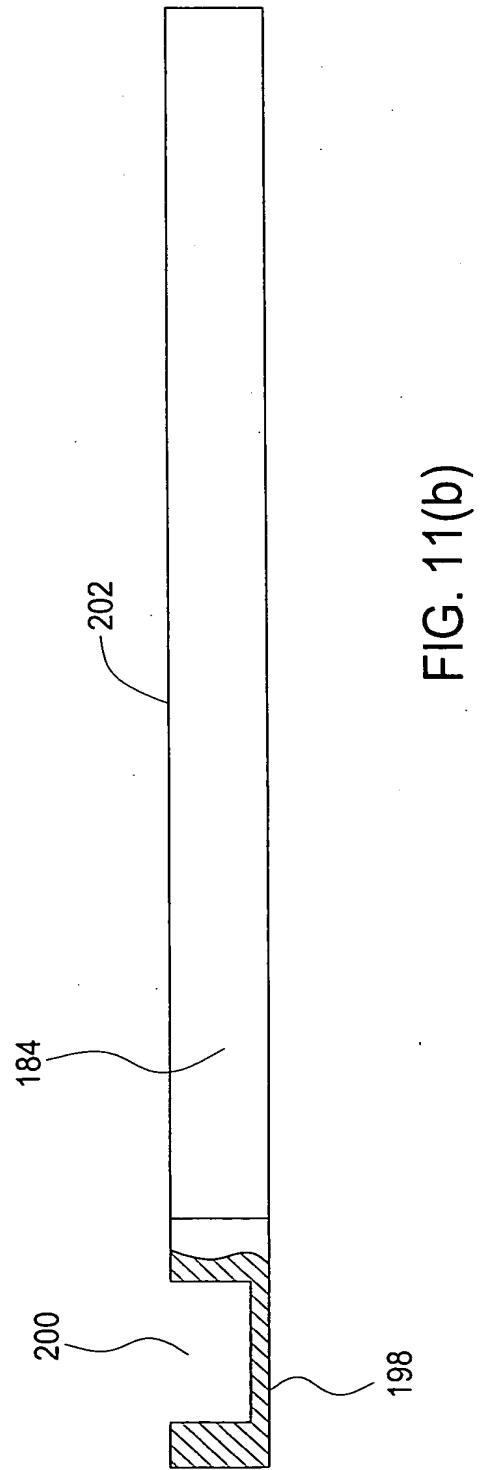
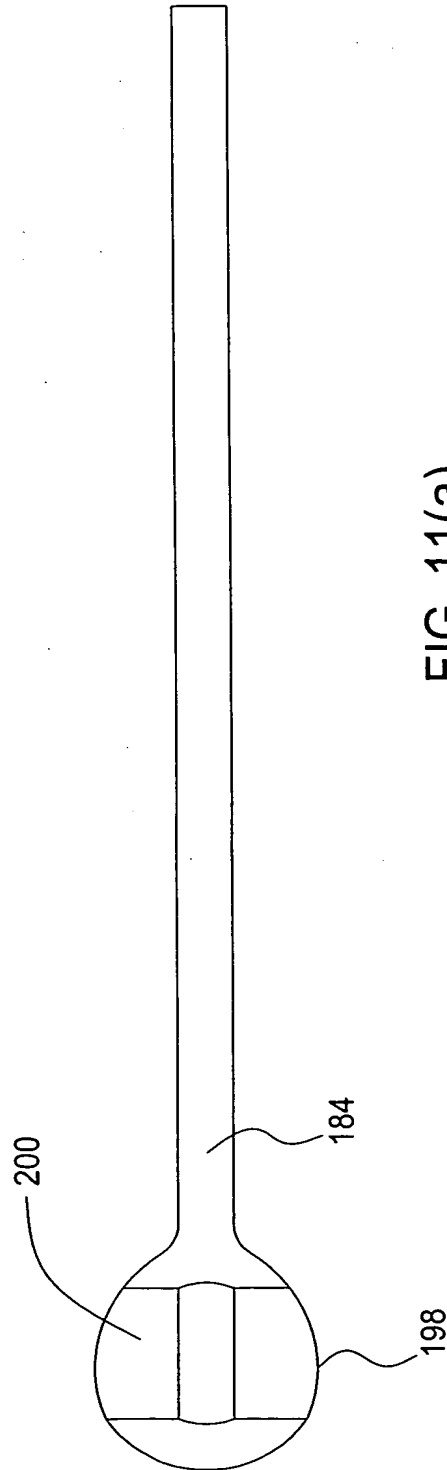
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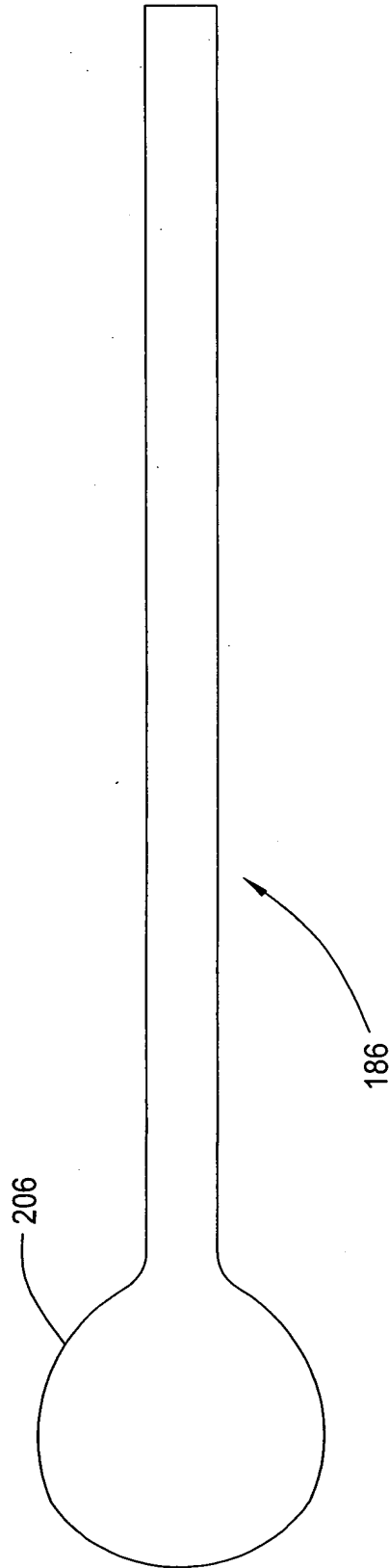


FIG. 12

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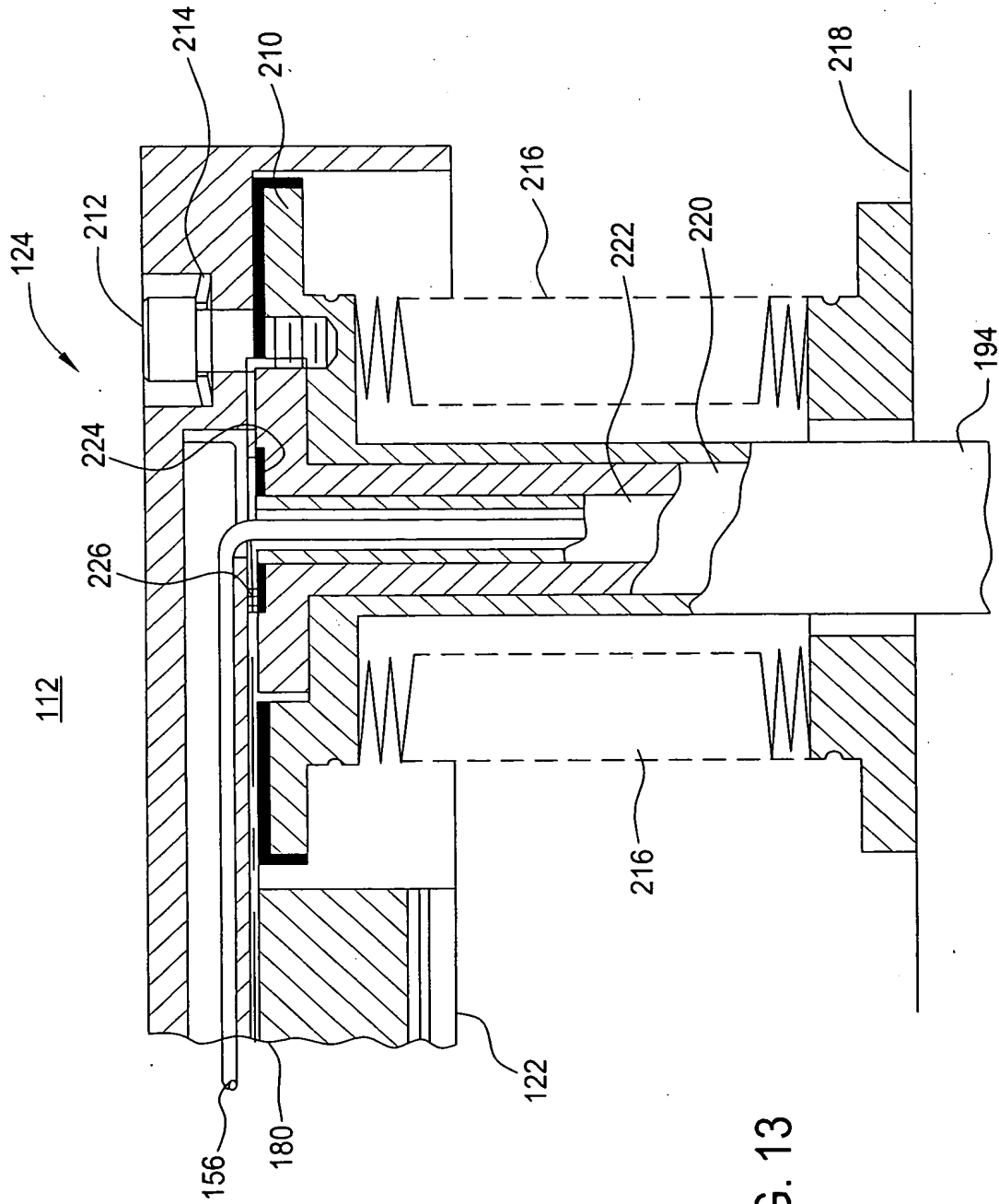


FIG. 13

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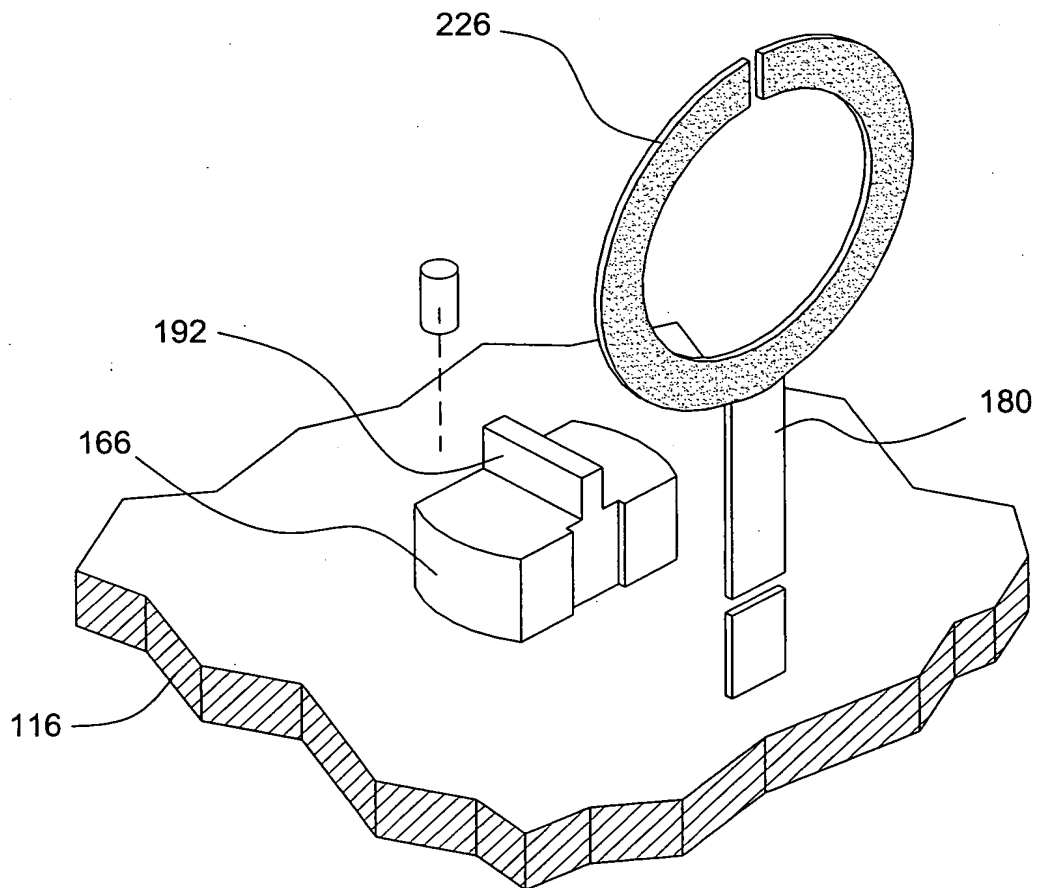


FIG. 14

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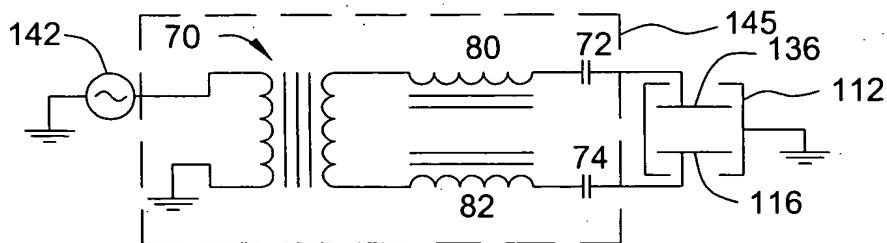


FIG. 15(a)

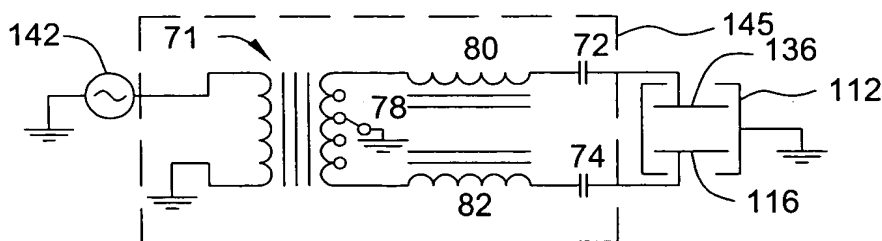


FIG. 15(b)

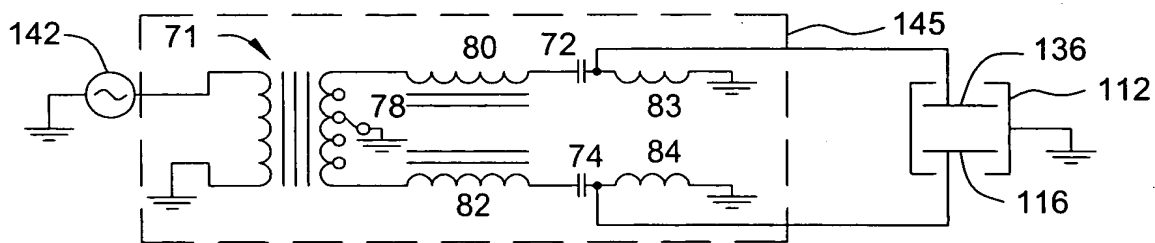
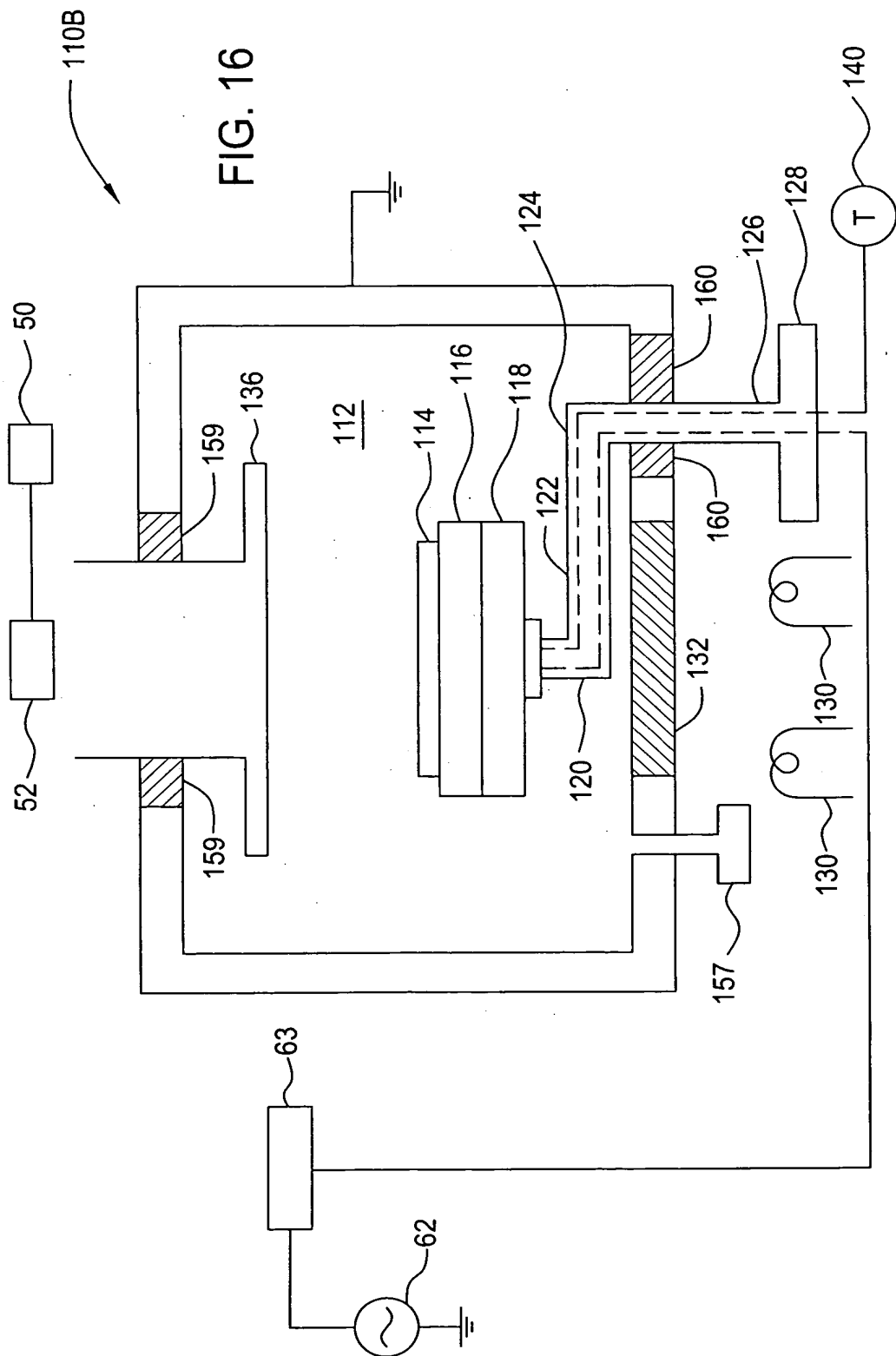


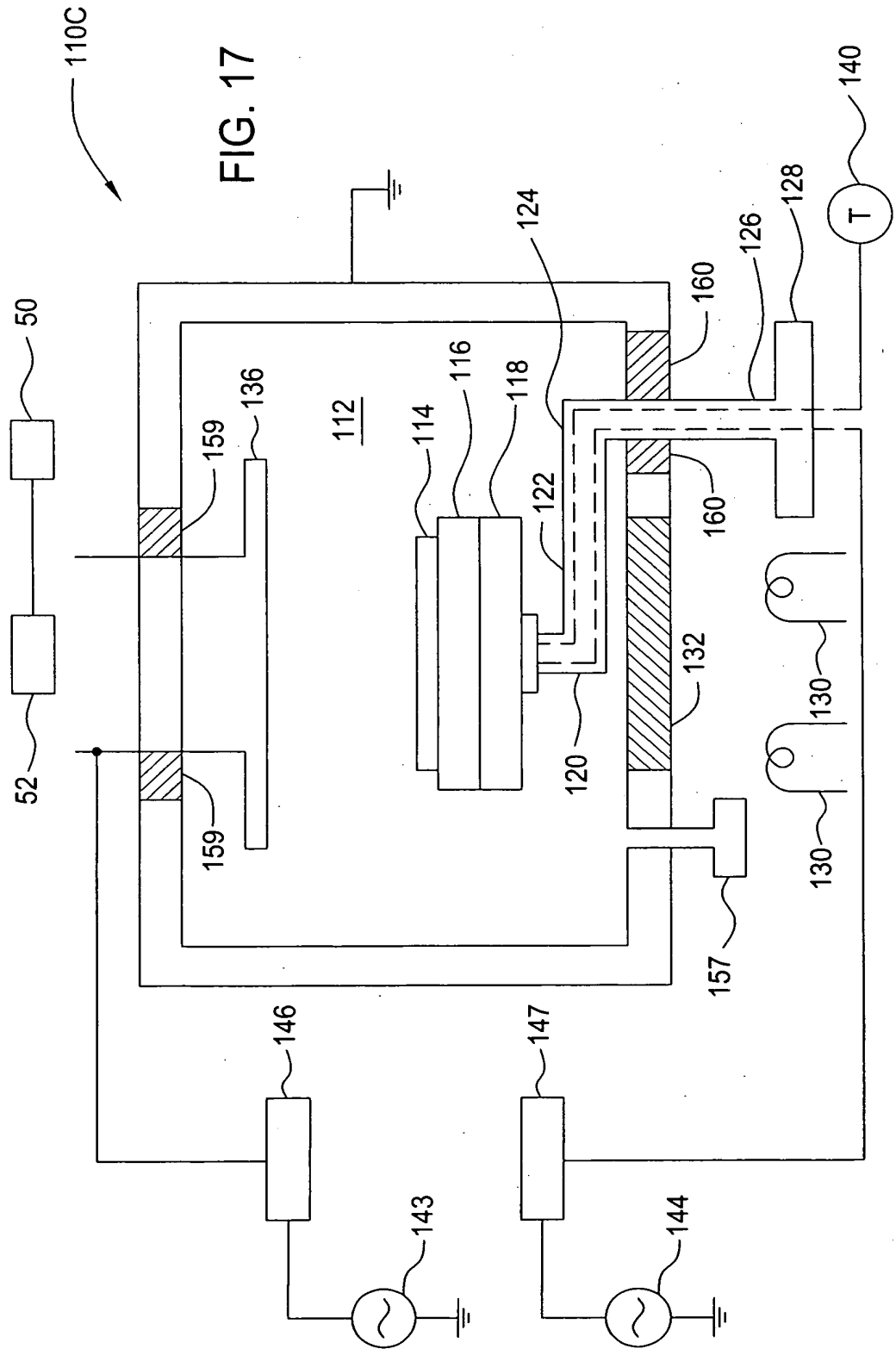
FIG. 15(c)

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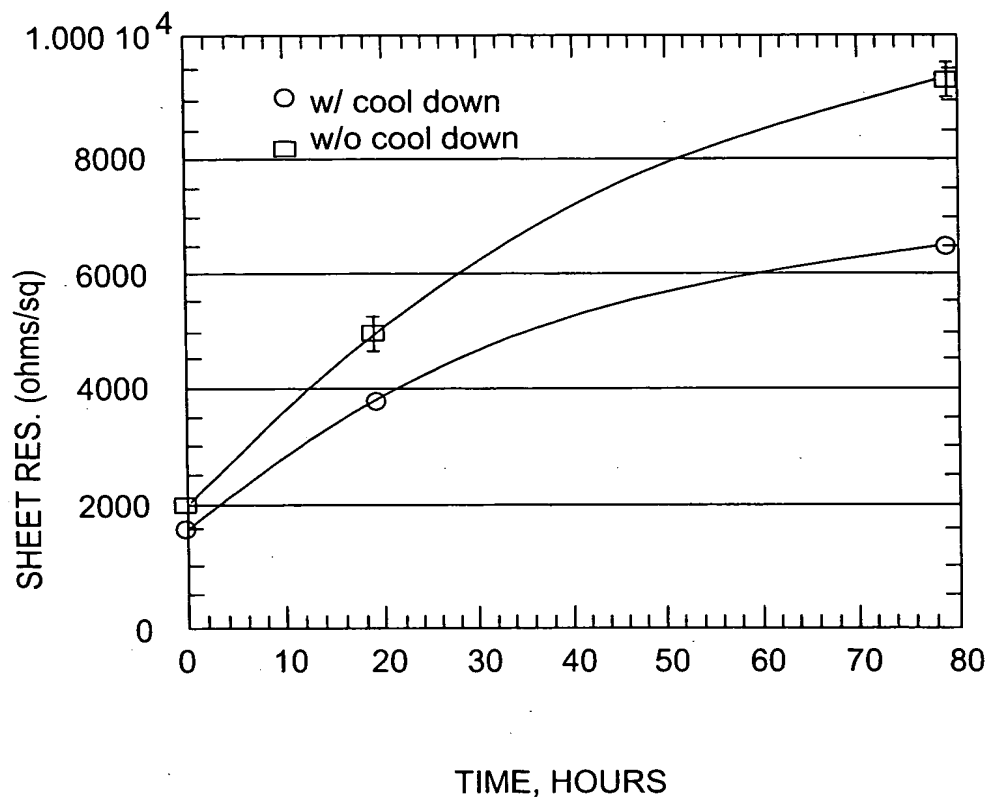
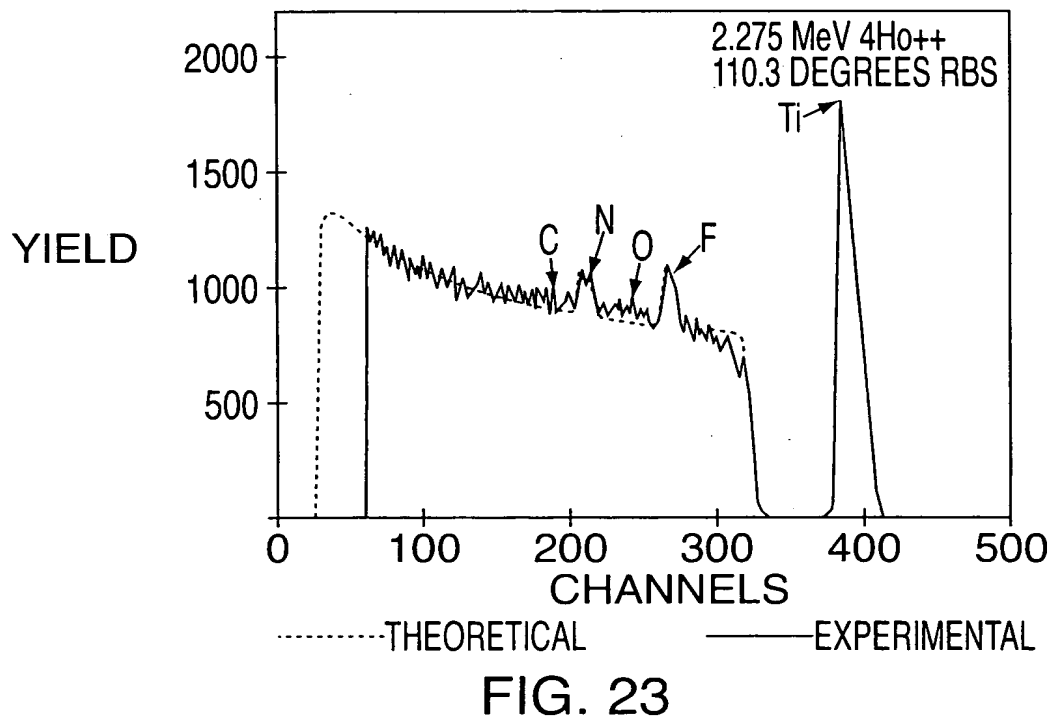
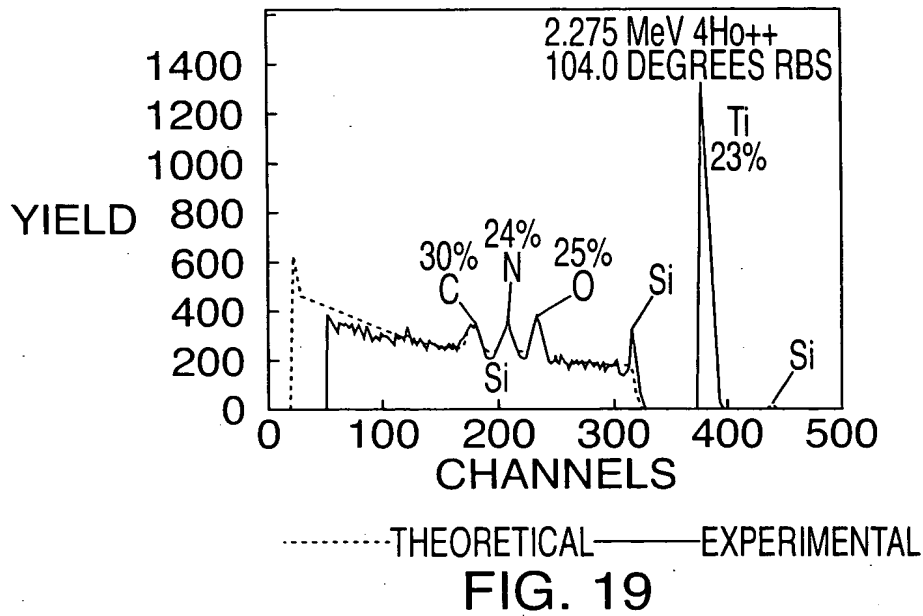


FIG. 18

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TABLE I

EXAMPLE	DESCRIPTION	THICKNESS, Å	RESISTIVITY, $\mu\Omega$ -cm
CONTROL		~500	16,000
C1	H <sub>2</sub> ADDED	~500	81,200
C2	NF <sub>3</sub> ADDED	~200	2,200
C3	H <sub>2</sub> /NF <sub>3</sub> ADDED	~400	1x10 <sup>6</sup>
C4	MIXED H <sub>2</sub> N <sub>2</sub> ADDED	~500	39,500

FIG. 20

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TABLE II			
SAMPLE	DESCRIPTION	THICKNESS, Å	RESISTIVITY, $\mu\Omega$ -cm
C5	H <sub>2</sub> PLASMA PRE/POST	~500	13,500
C6	N <sub>2</sub> PLASMA PRE/POST	~500	15,500
C7	NF <sub>3</sub> FLOW PRIOR TO DEPOSITION	~500	16,500

FIG. 21

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TABLE III								
SAMPLE	NUMBER OF CYCLES	THICKNESS PER CYCLE, Å	POWER, WATTS	TIME, SEC	TIME, THICKNESS, Å	RESISTIVITY, $\mu\Omega$ -cm		PERCENT CHANGE
						INITIAL	24 HOURS	
CONTROL	5	100	----	----	226	11,020	25,385	130
EX. 1	2	500	100	30	731	4,620	6,623	43
EX. 2	3	333	100	30	707	2,870	3,623	26
EX. 3	4	250	100	30	654	2,027	2,662	31
EX. 4	2	500	100	60	579	2,762	3,827	39
EX. 5	3	333	100	60	604	2,150	2,549	19
EX. 6	4	250	100	60	606	1,630	1,915	17
EX. 7	5	100	100	30	376	1,154	1,203	4
EX. 8	5	50	100	30	220	913	933	2

FIG. 22

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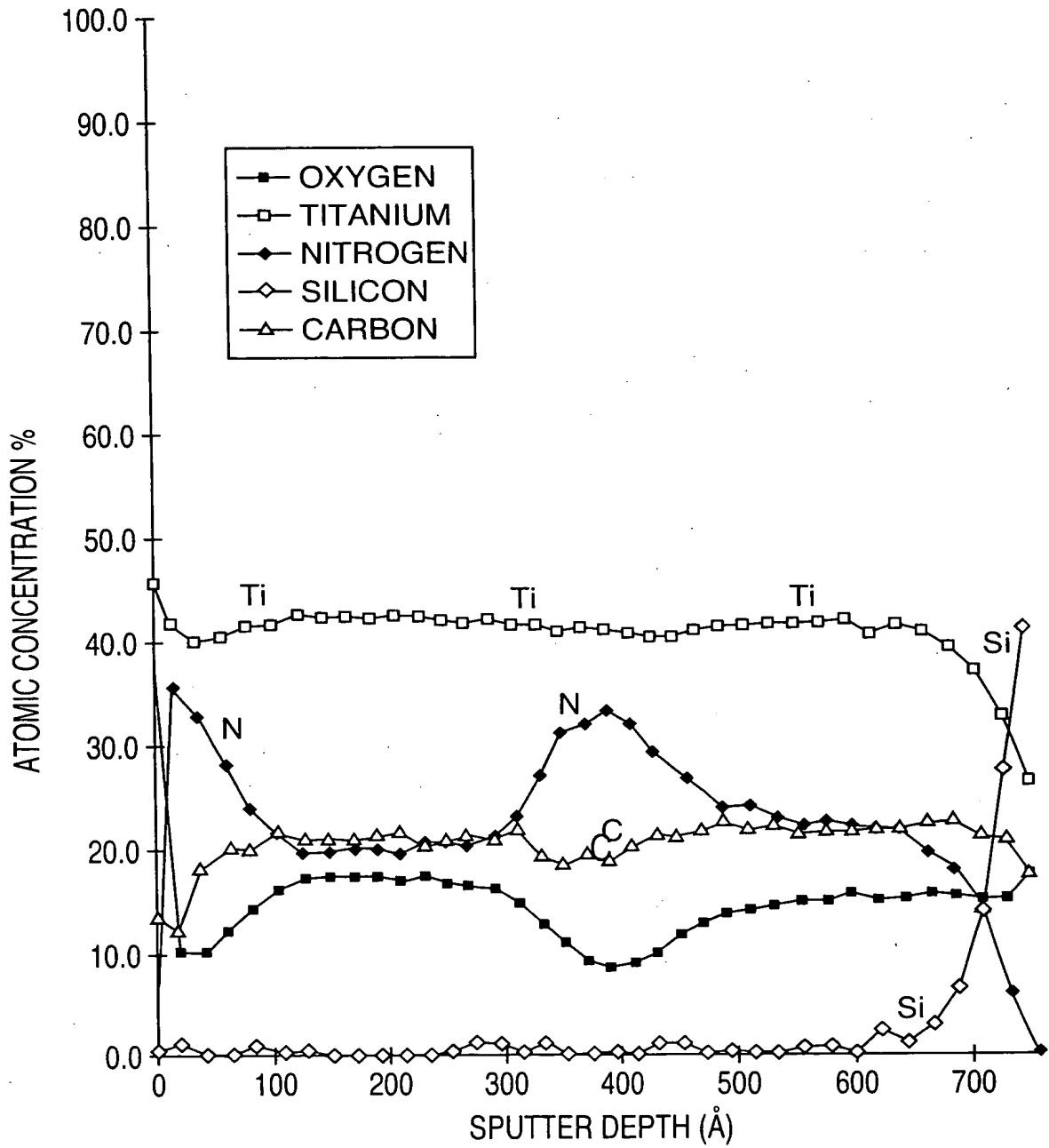


FIG. 24

TABLE IV			
DEPTH, Å	O <sub>2</sub> , %	N <sub>2</sub> , %	C, %
42	9.8	32.4	18.1
188	17.2	20.0	20.9
397	8.2	32.6	18.6
543	14.3	22.8	21.9

FIG. 25



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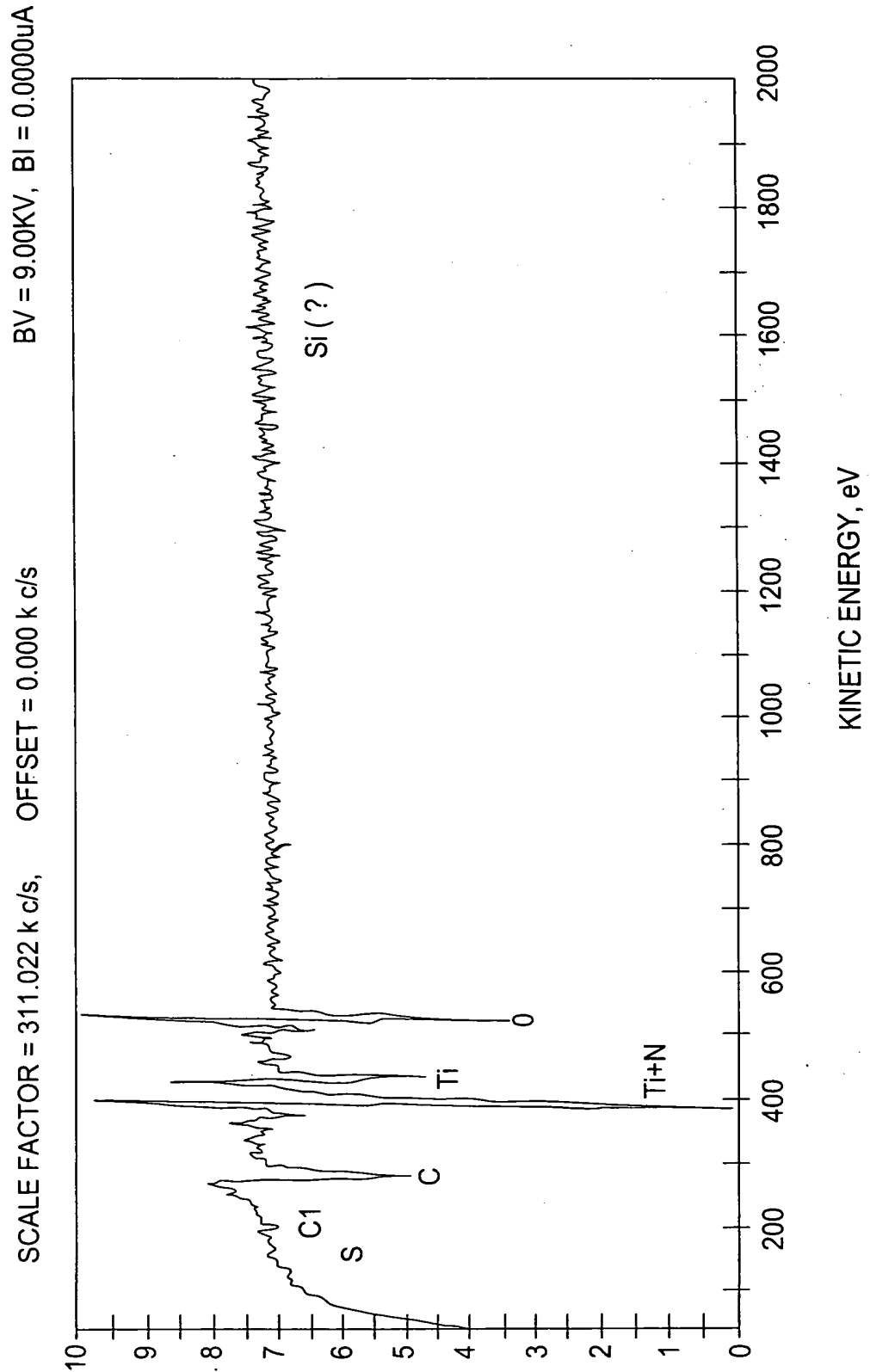


FIG. 26

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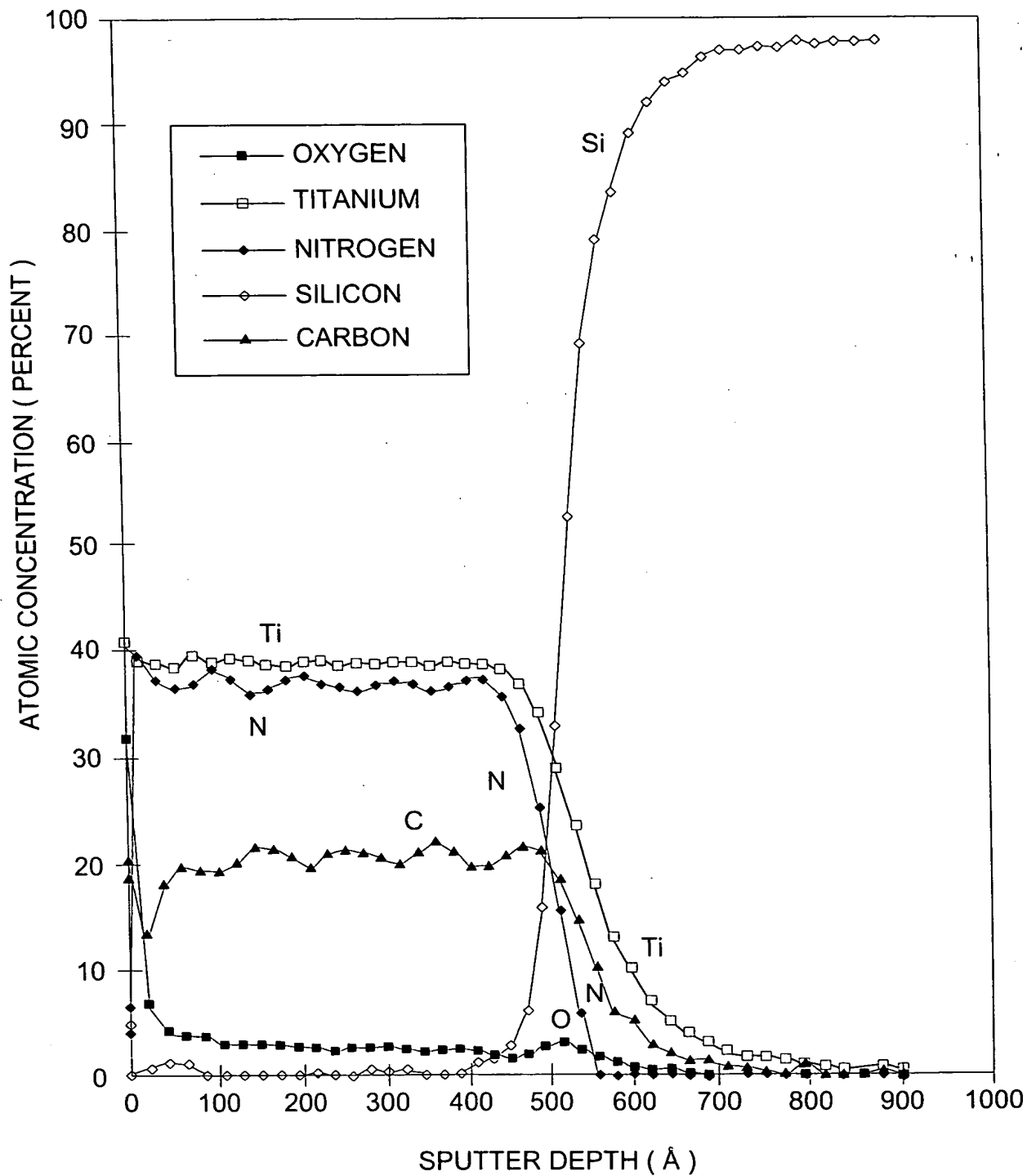


FIG. 27

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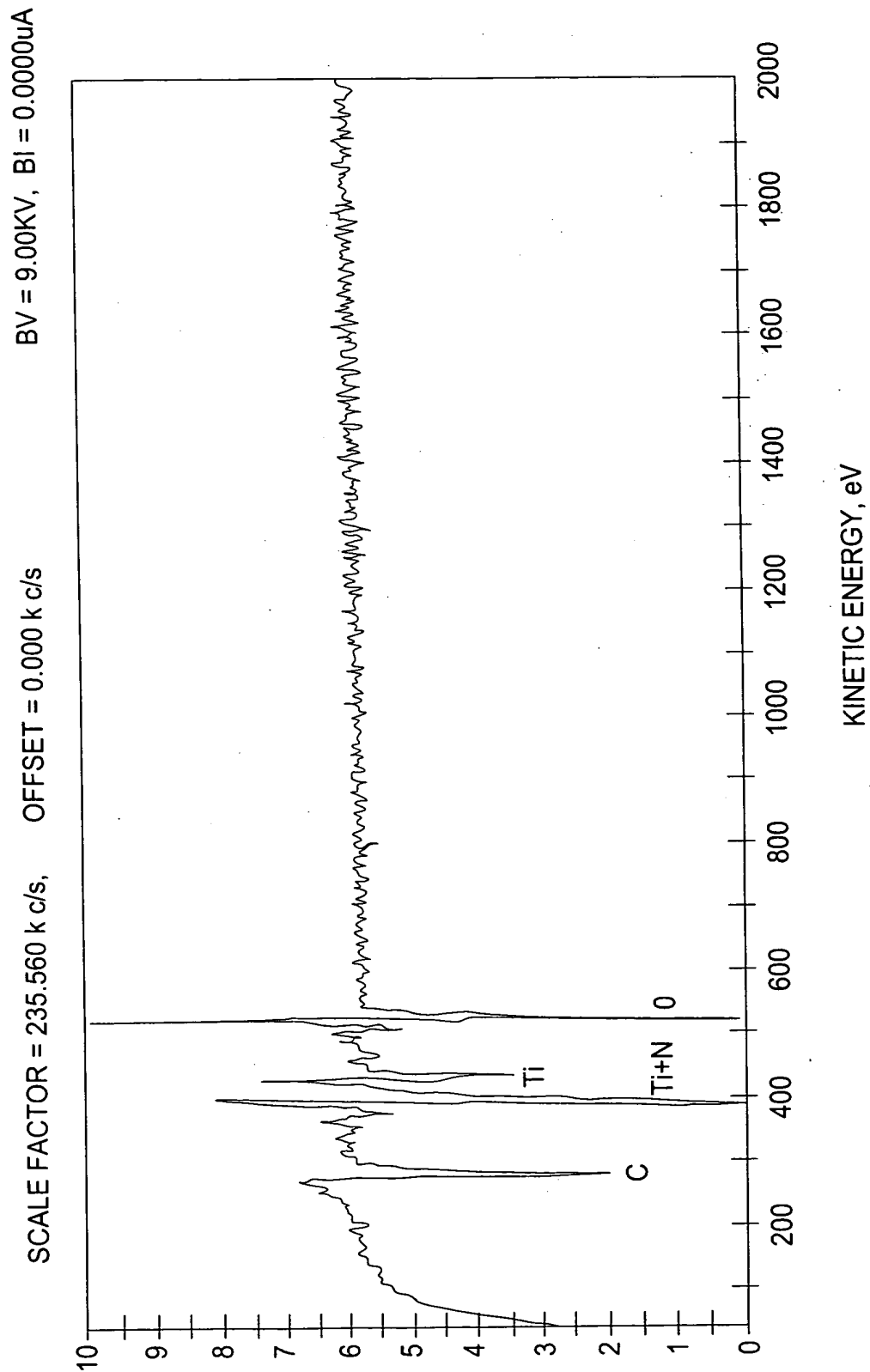


FIG. 28

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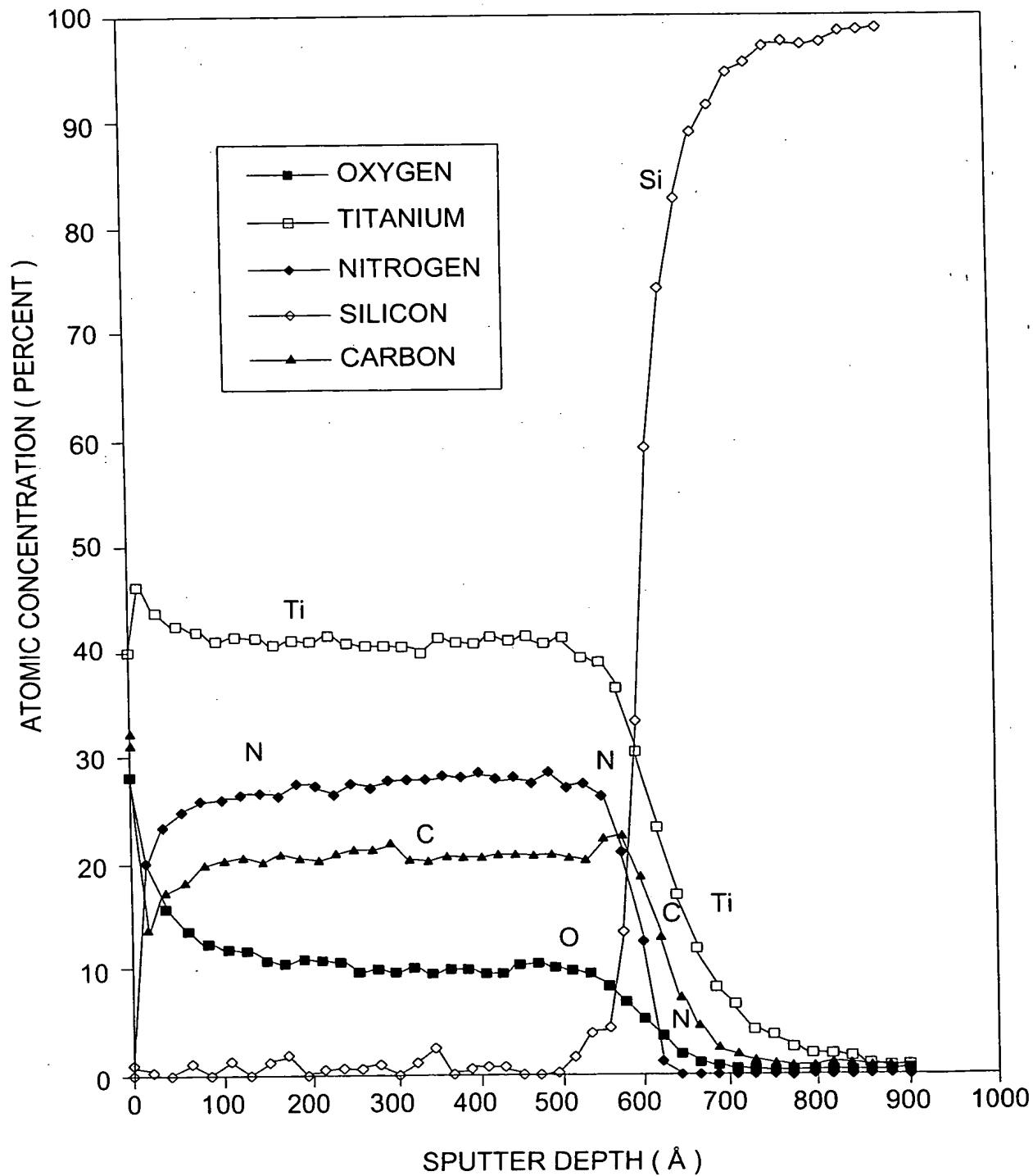


FIG. 29

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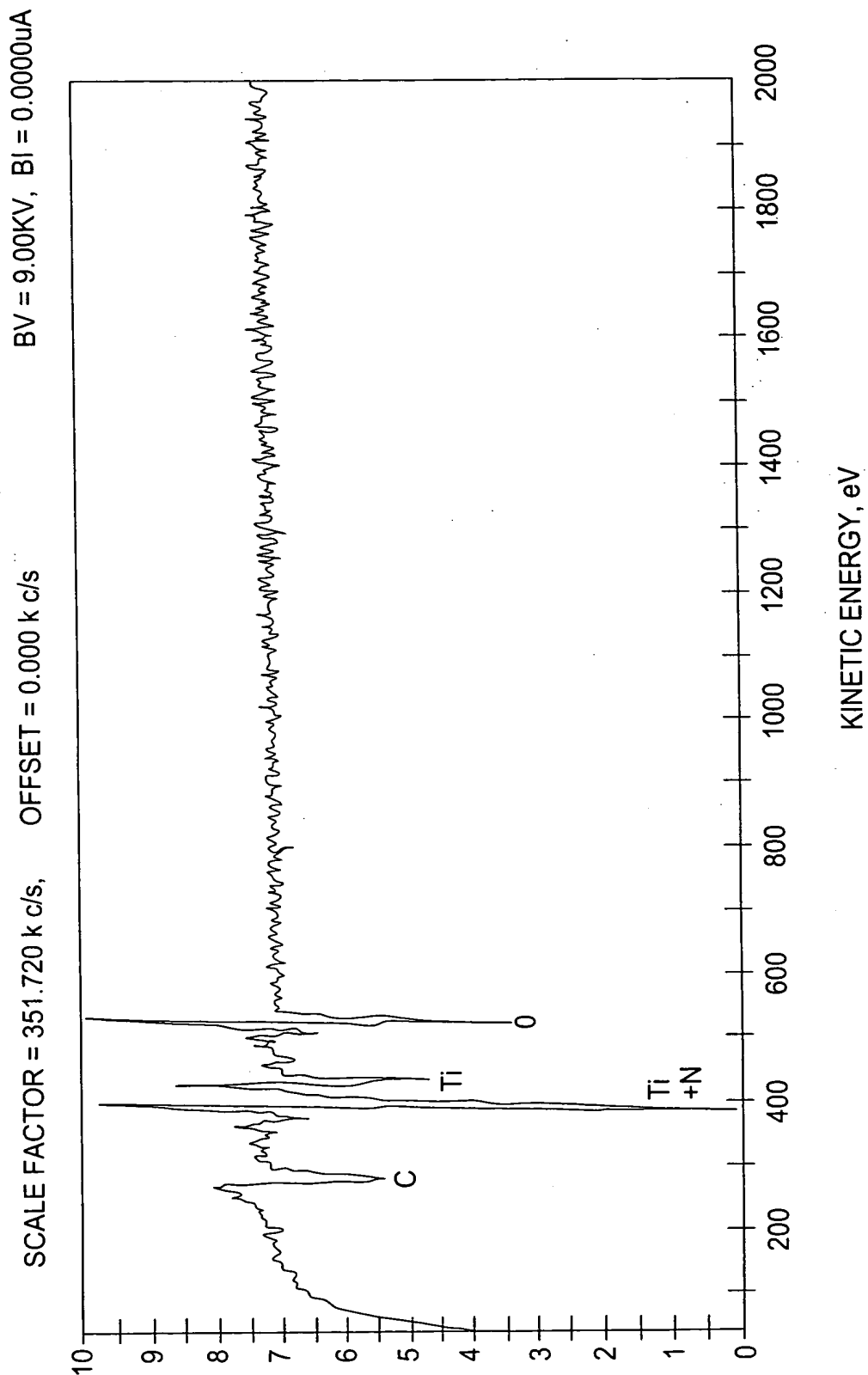


FIG. 30

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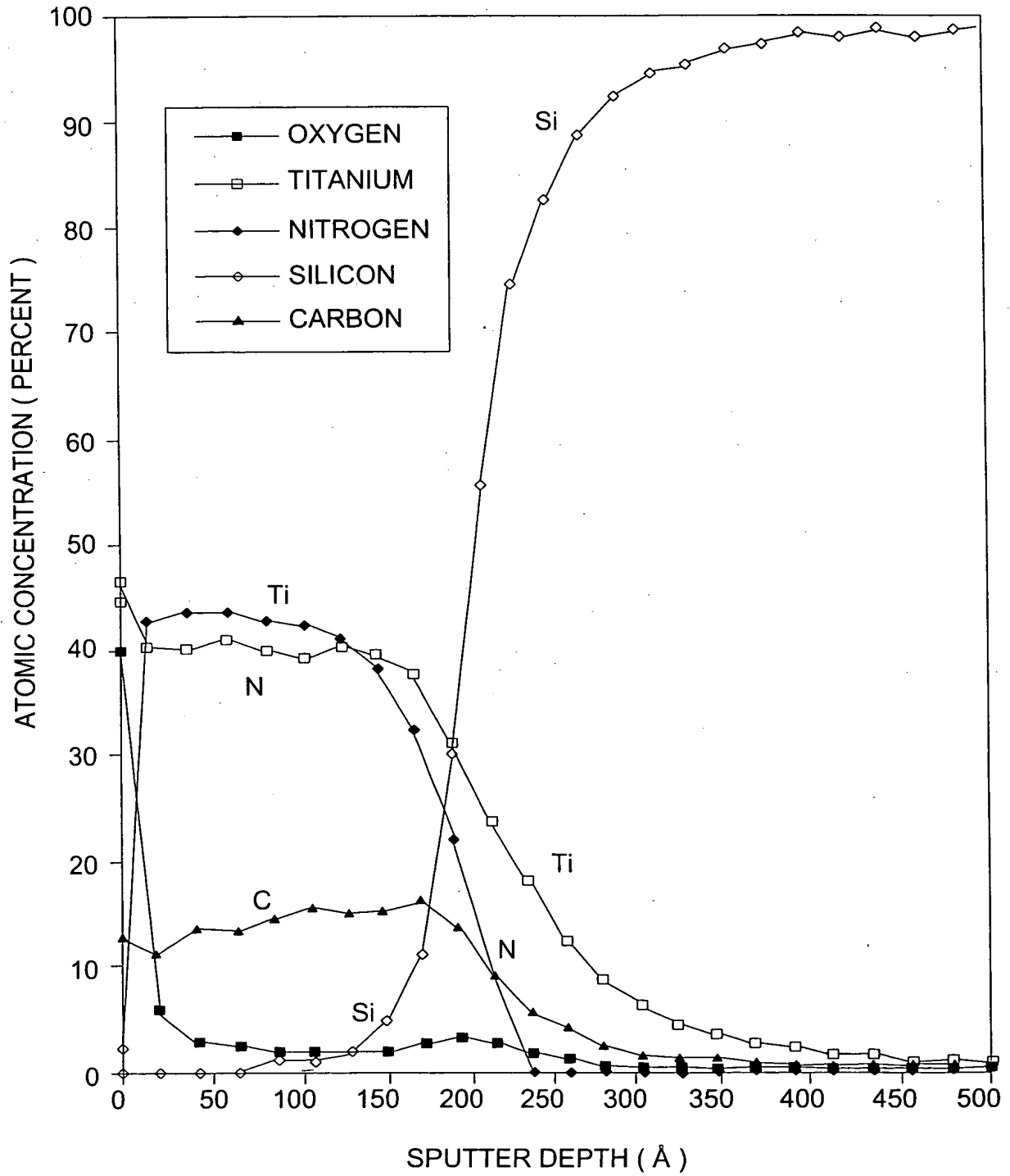


FIG. 31

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TABLE V	
CONTROL	$3.48 \times 10^{22} \text{ cm}^{-3}$
EXAMPLE 7	$3.96 \times 10^{22} \text{ cm}^{-3}$
EXAMPLE 8	$3.94 \times 10^{22} \text{ cm}^{-3}$

FIG. 32

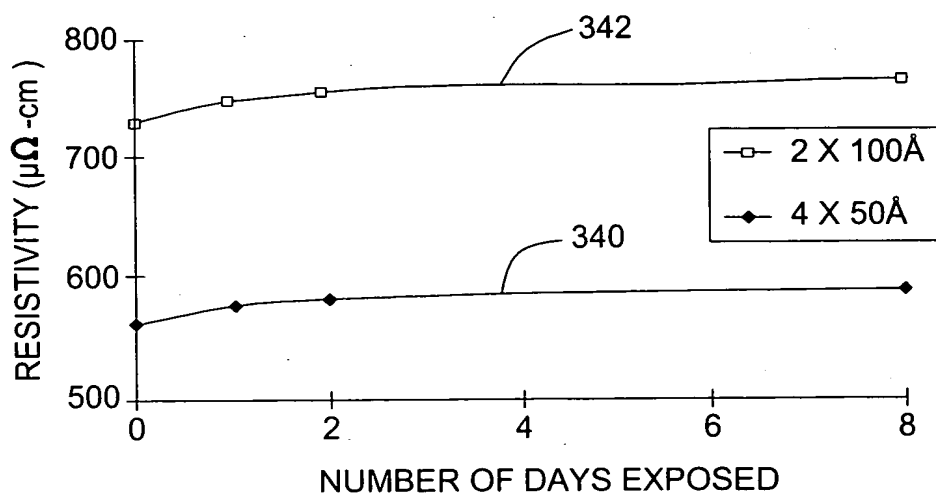


FIG. 36

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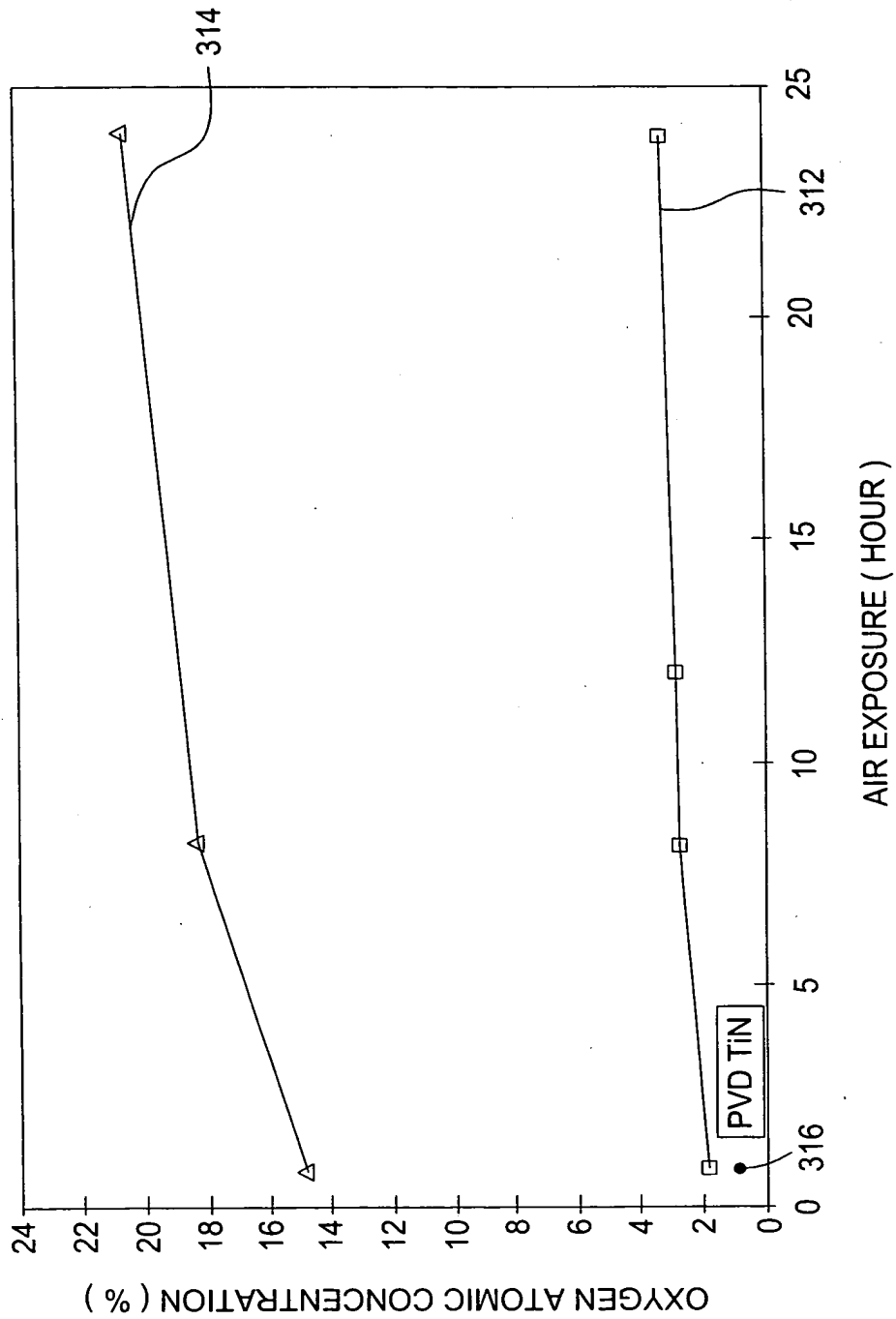


FIG. 33



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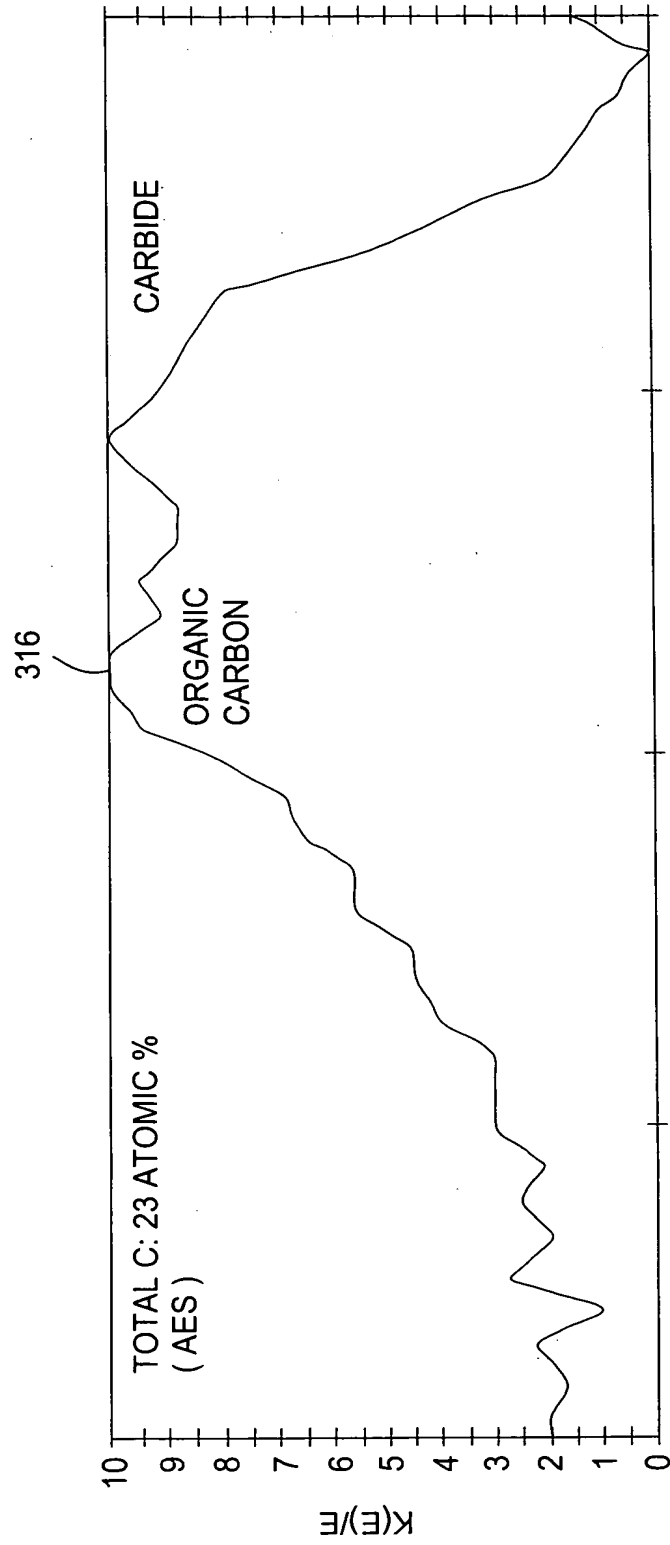


FIG. 34A

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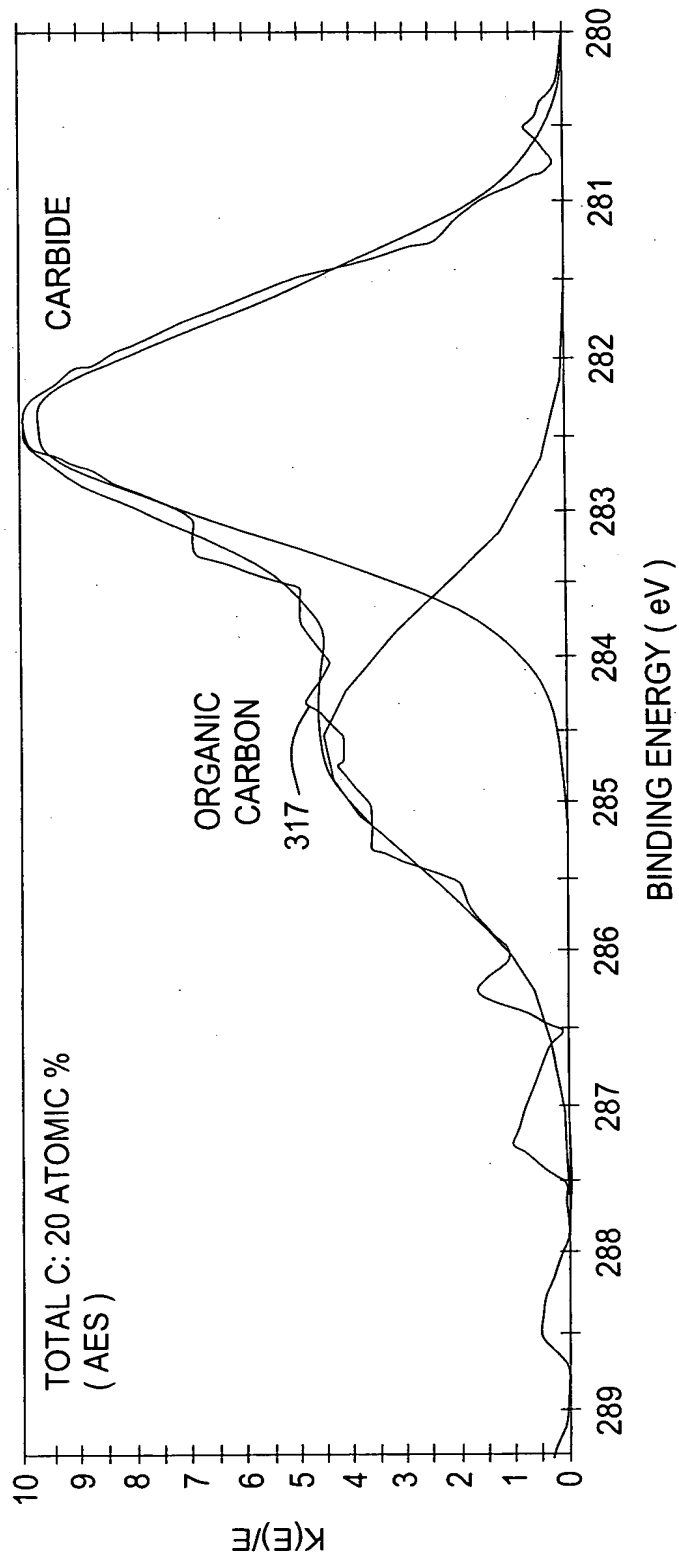


FIG. 34B

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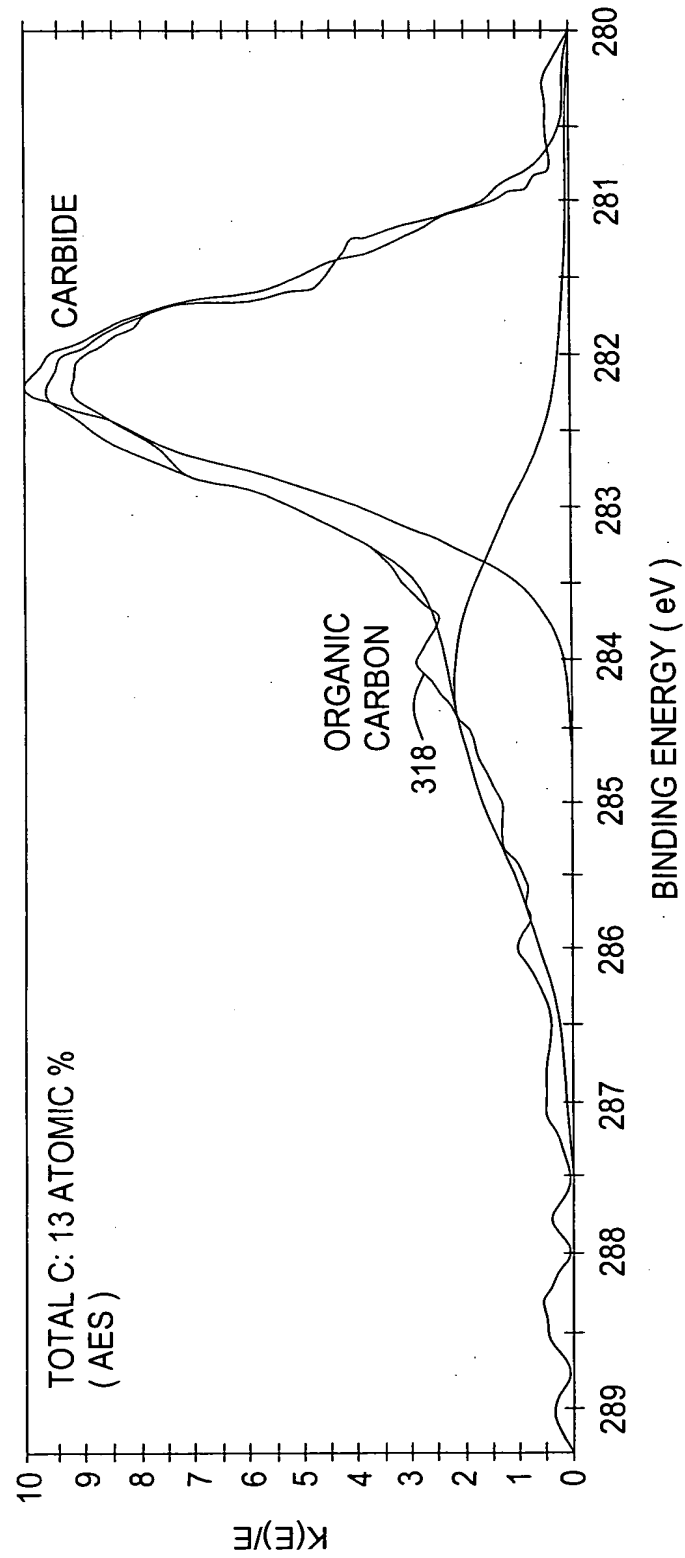


FIG. 34C

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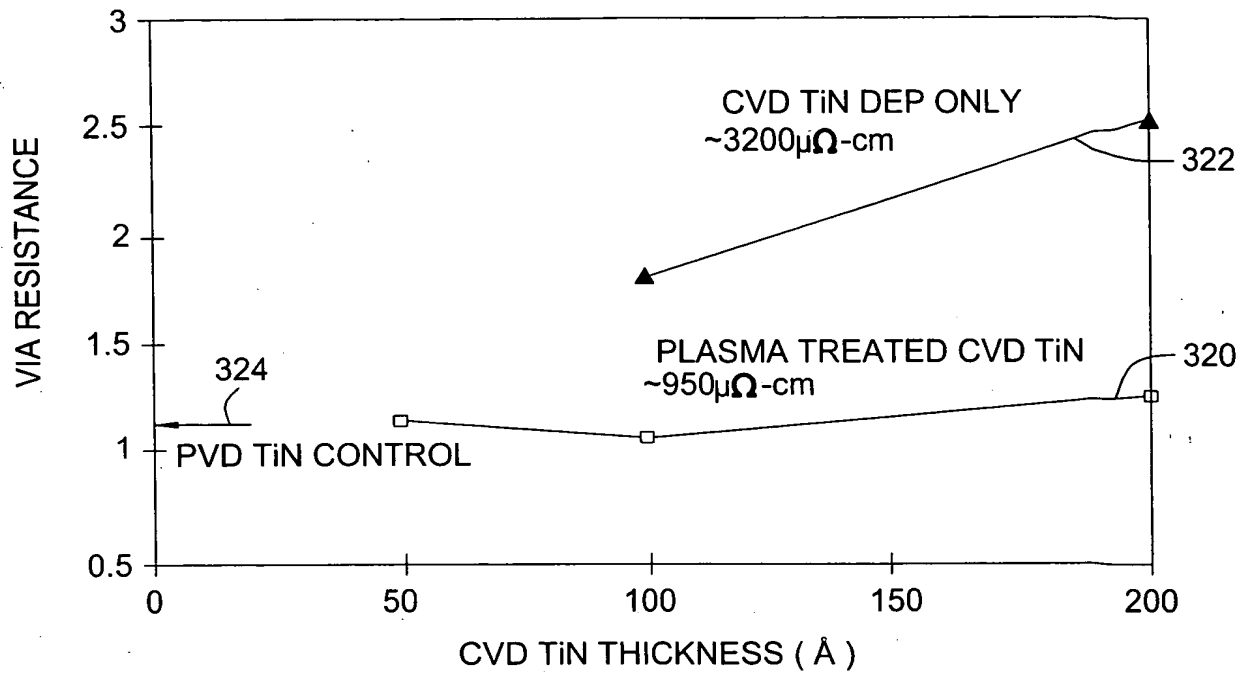


FIG. 35A

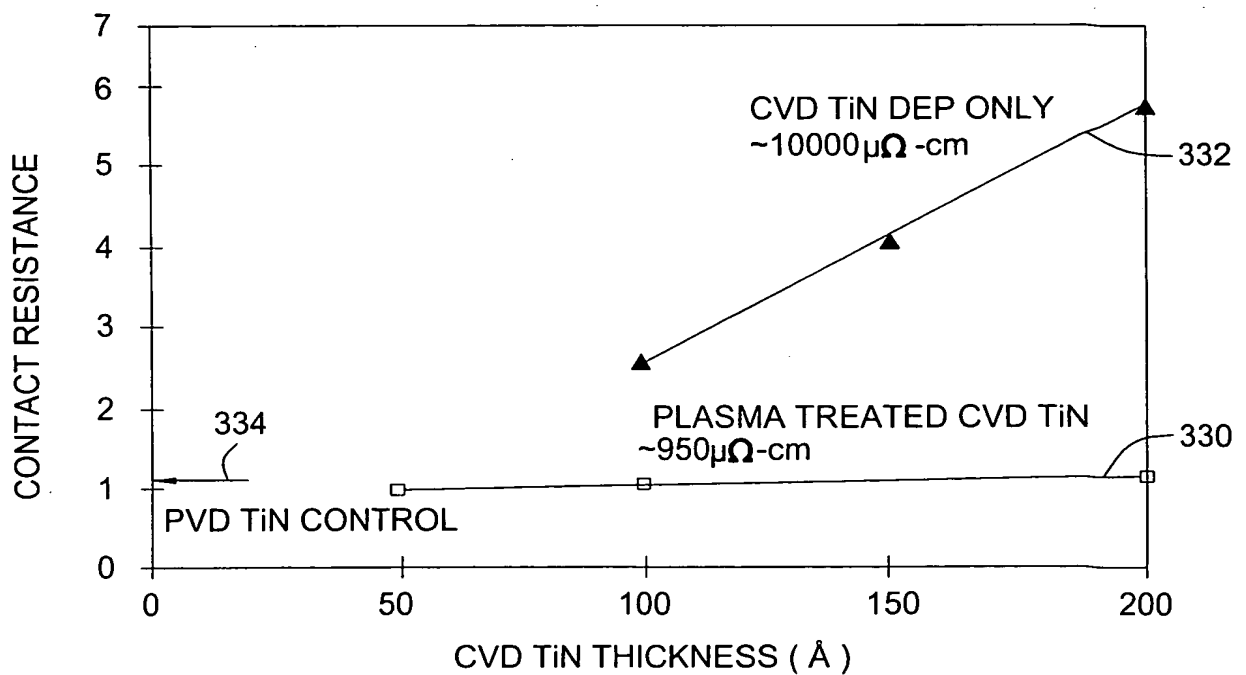


FIG. 35B

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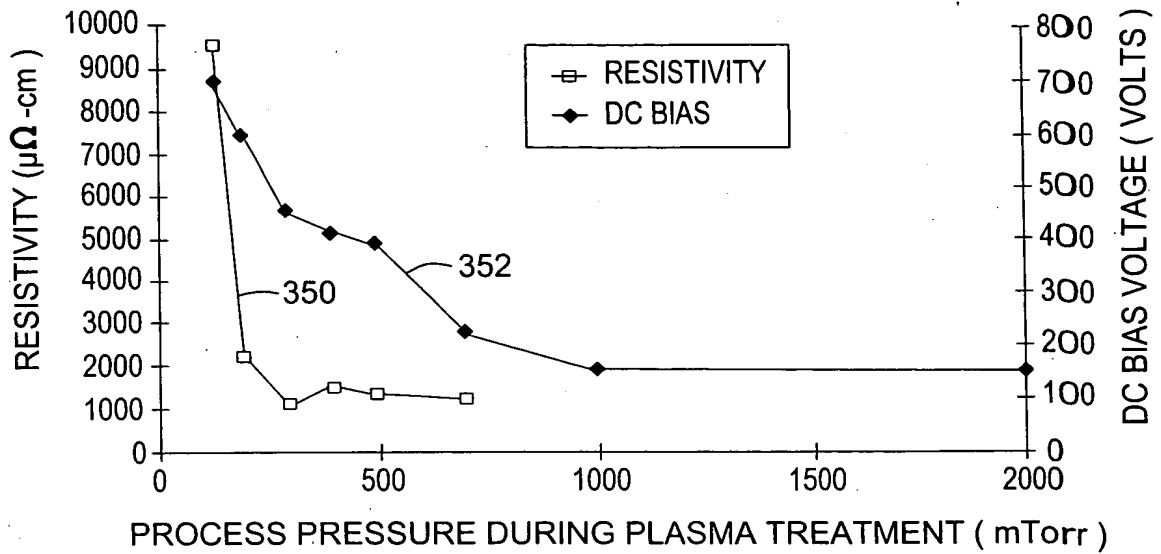


FIG. 37

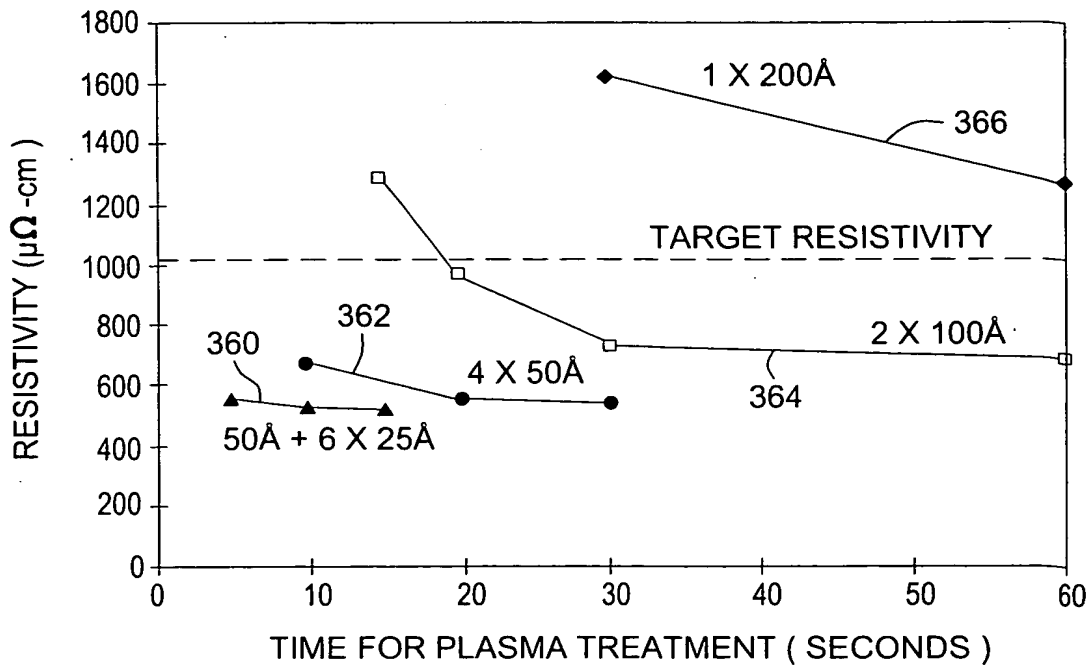


FIG. 38A

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EFFECT OF PLASMA TIME AND FREQUENCY ON FILM RESISTIVITY

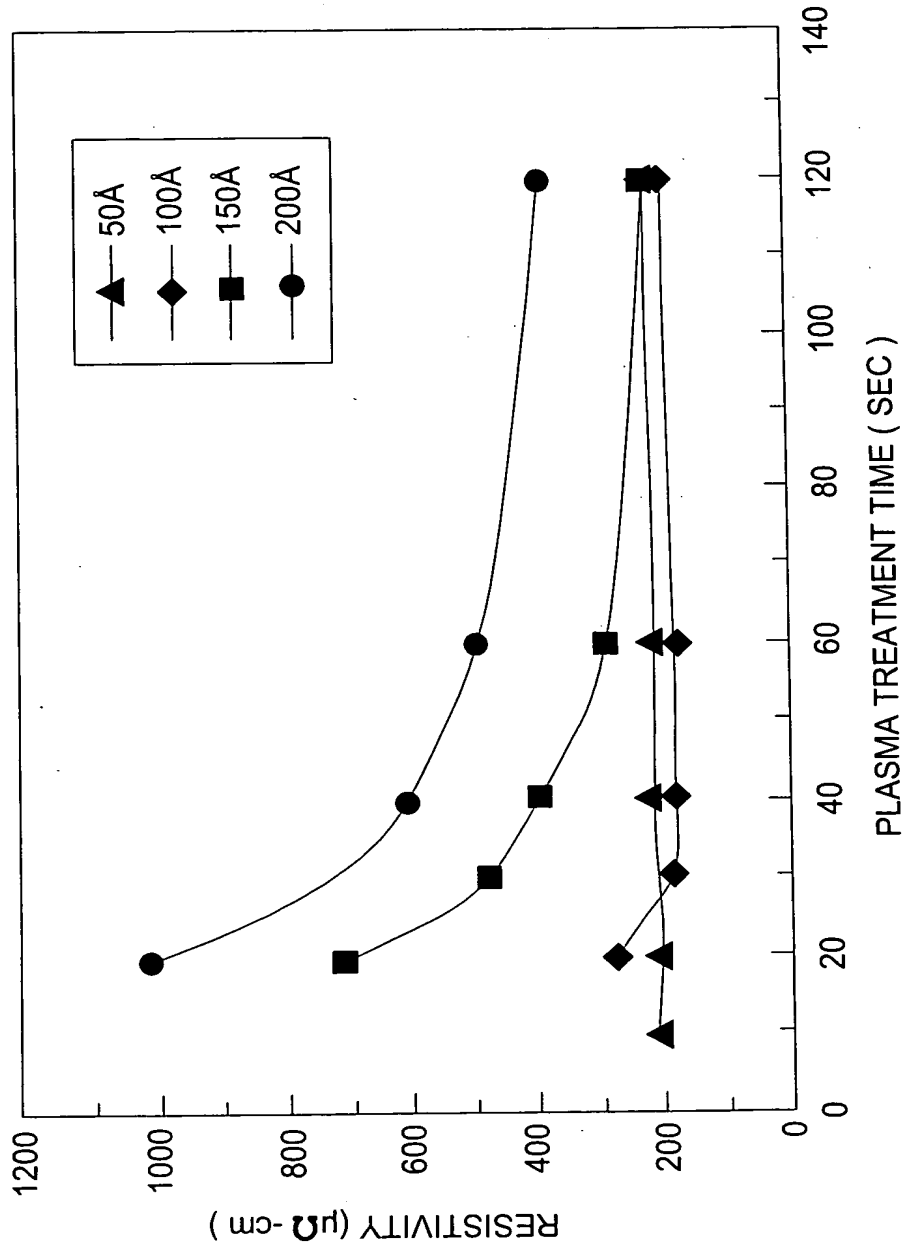


FIG. 38B

SATURATION OF PLASMA TREATMENT AT 50 Å INTERVAL

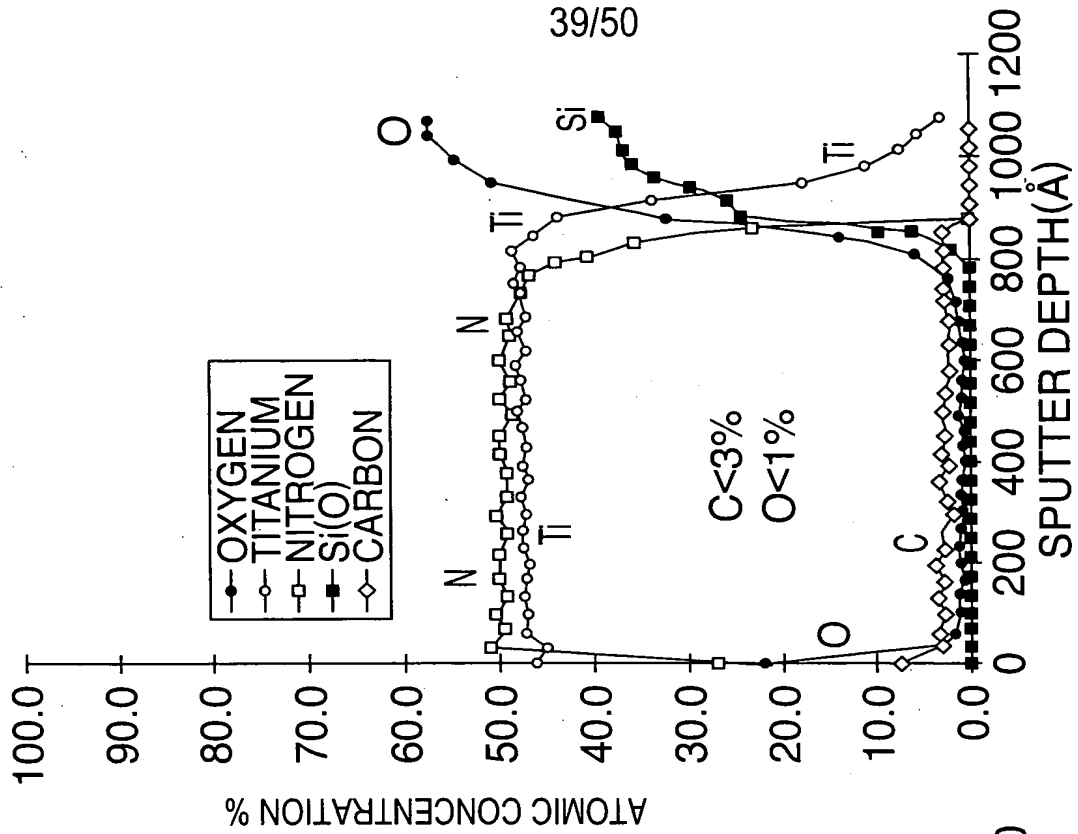


FIG. 39b

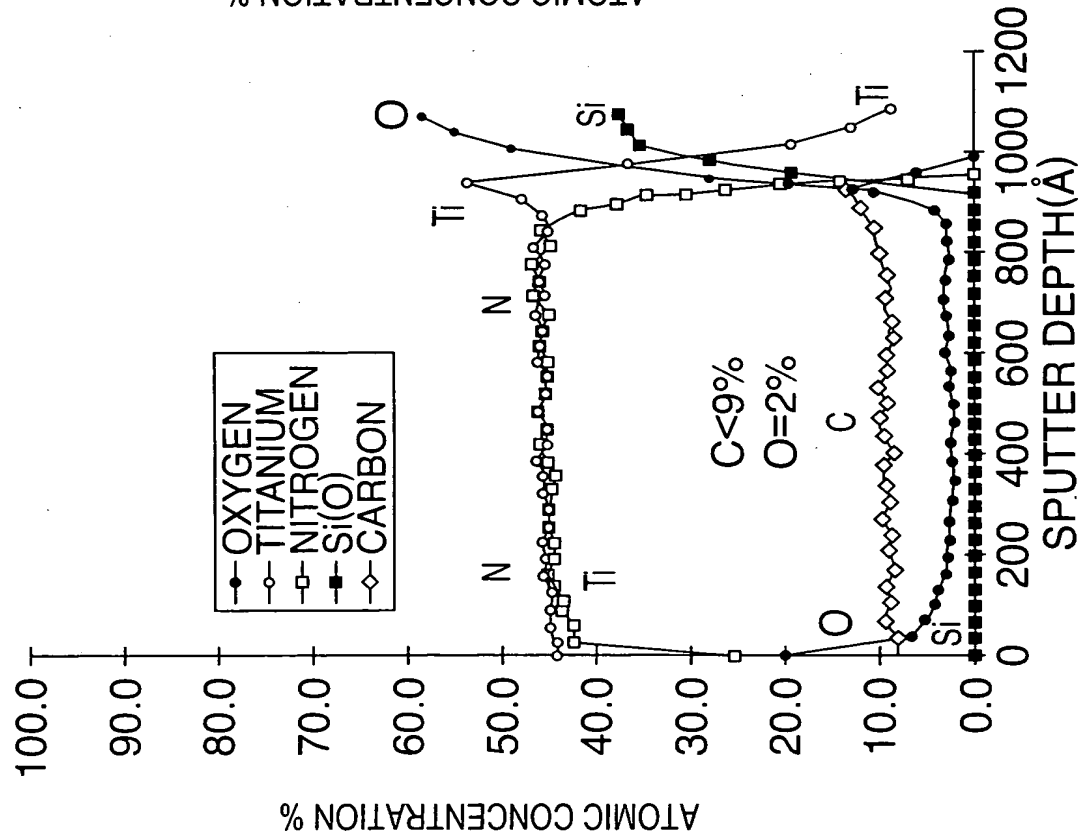


FIG. 39a

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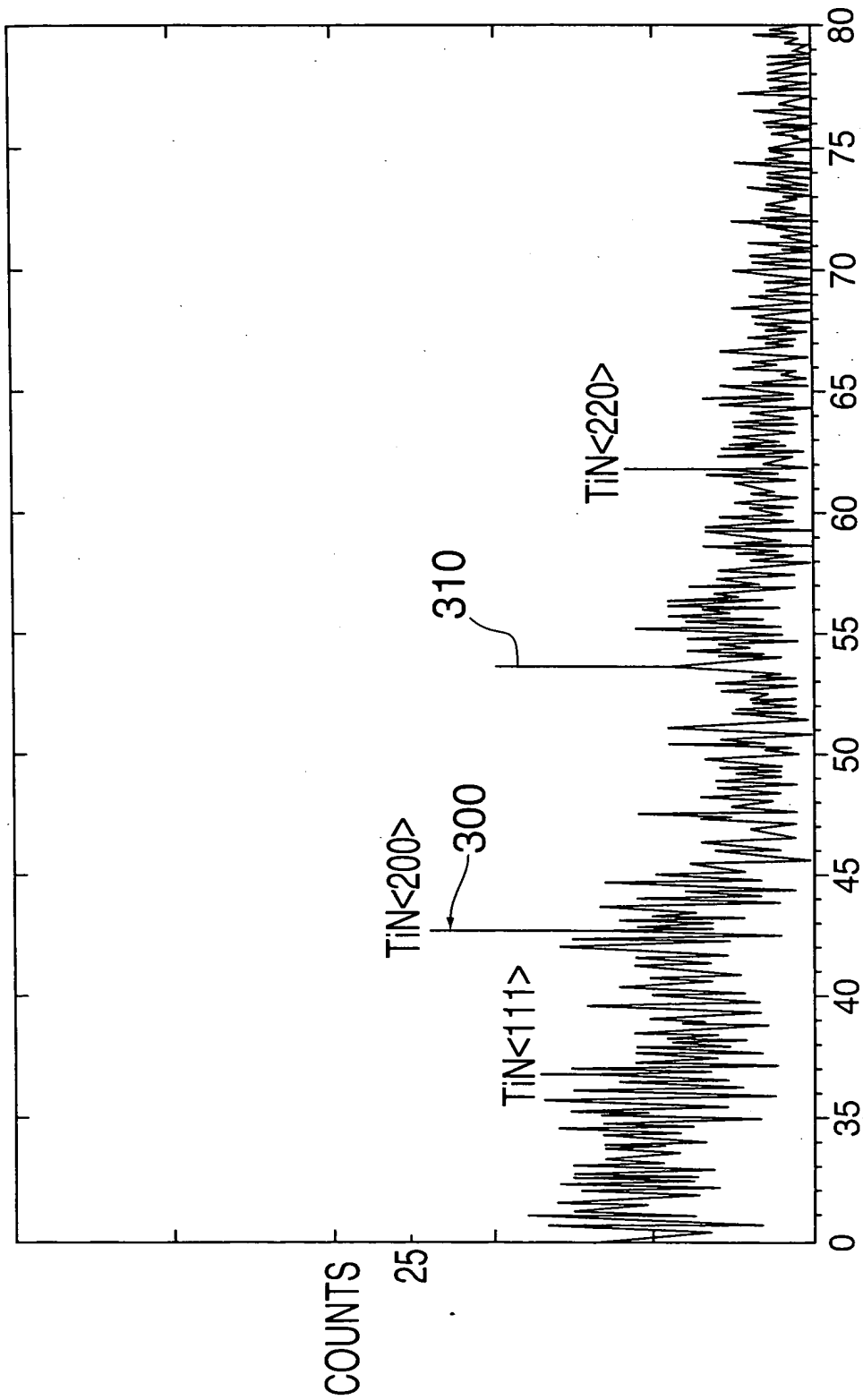


FIG. 40



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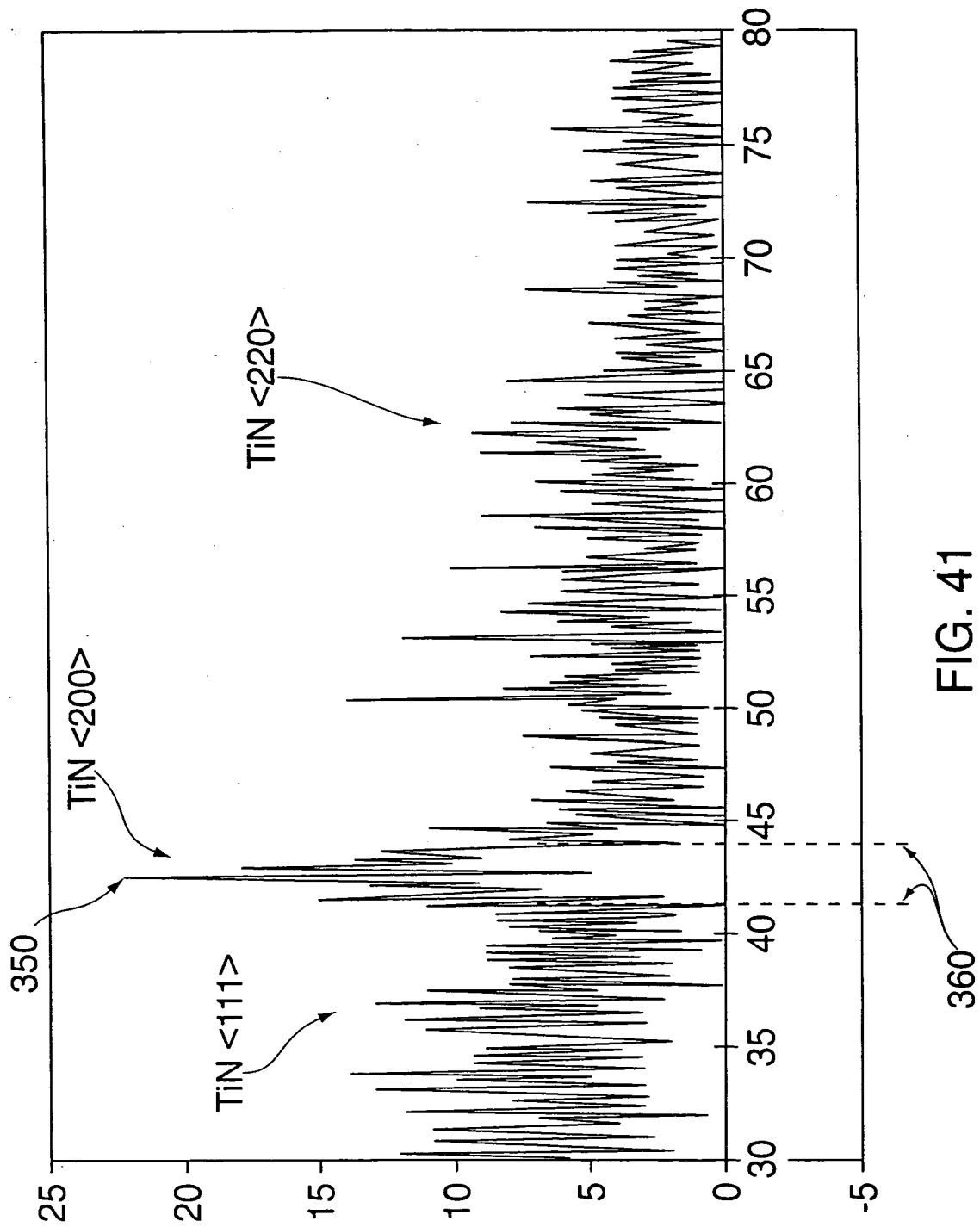


FIG. 41

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TABLE VI					
GAS	2x100 RESISTIVITY ( $\mu\Omega$ -cm)	RESISTIVITY AGING @ 50 HOURS (%)	OXYGEN CONCENTRATION (%)	CARBON CONCENTRATION (%)	
N <sub>2</sub> /H <sub>2</sub>	570 - 630	11 - 12	12	8	
N <sub>2</sub> /H <sub>2</sub> + N <sub>2</sub>	450-500	7 - 8	10.8	12	
N <sub>2</sub> /H <sub>2</sub> + N <sub>2</sub> /He	440-480	3 - 7	9.1	10.5	
N <sub>2</sub> /H <sub>2</sub> + N <sub>2</sub> + N <sub>2</sub> /H <sub>2</sub>	540-600	11 - 12	10.5	12.3	

FIG. 42

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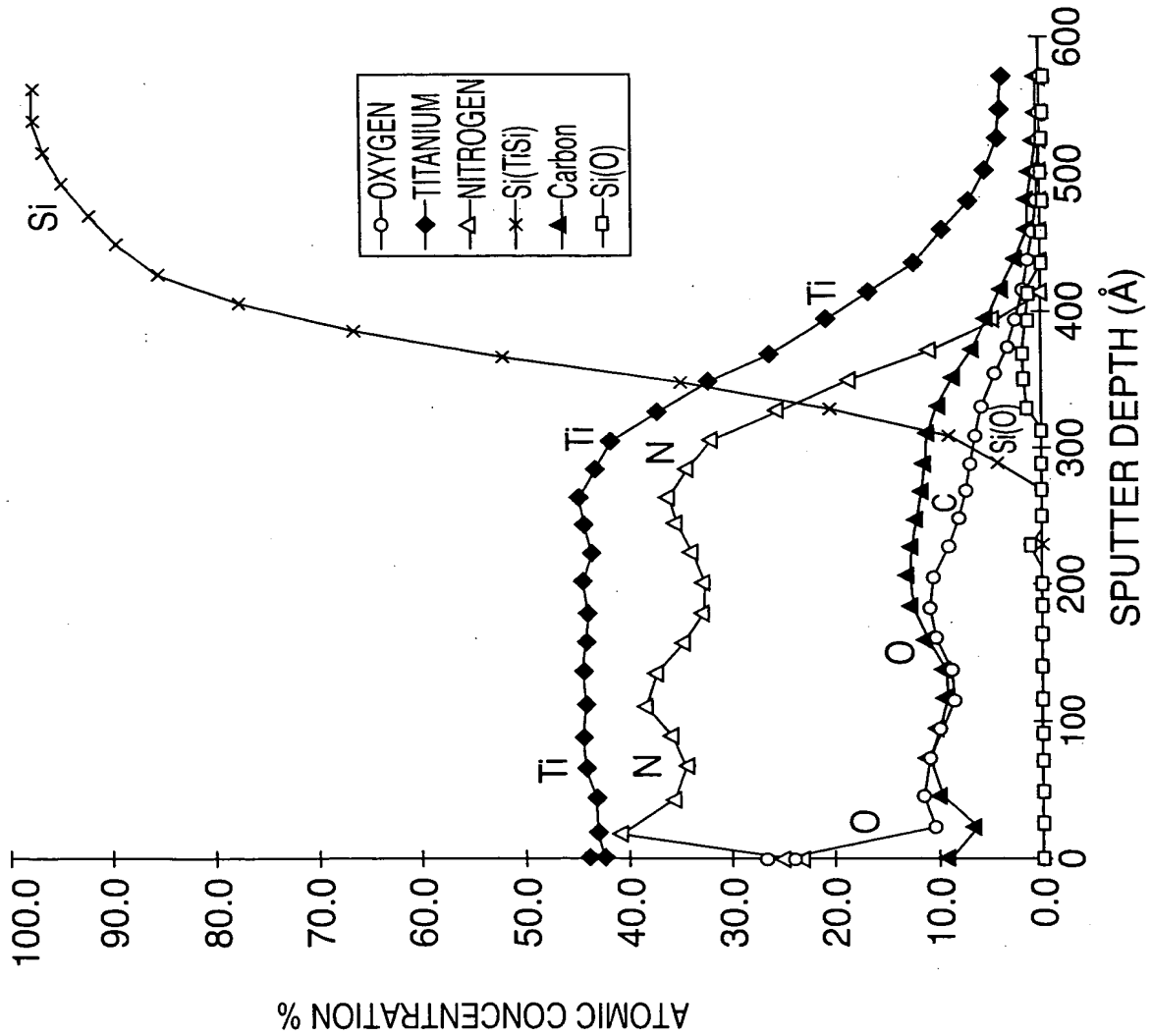


FIG. 43a

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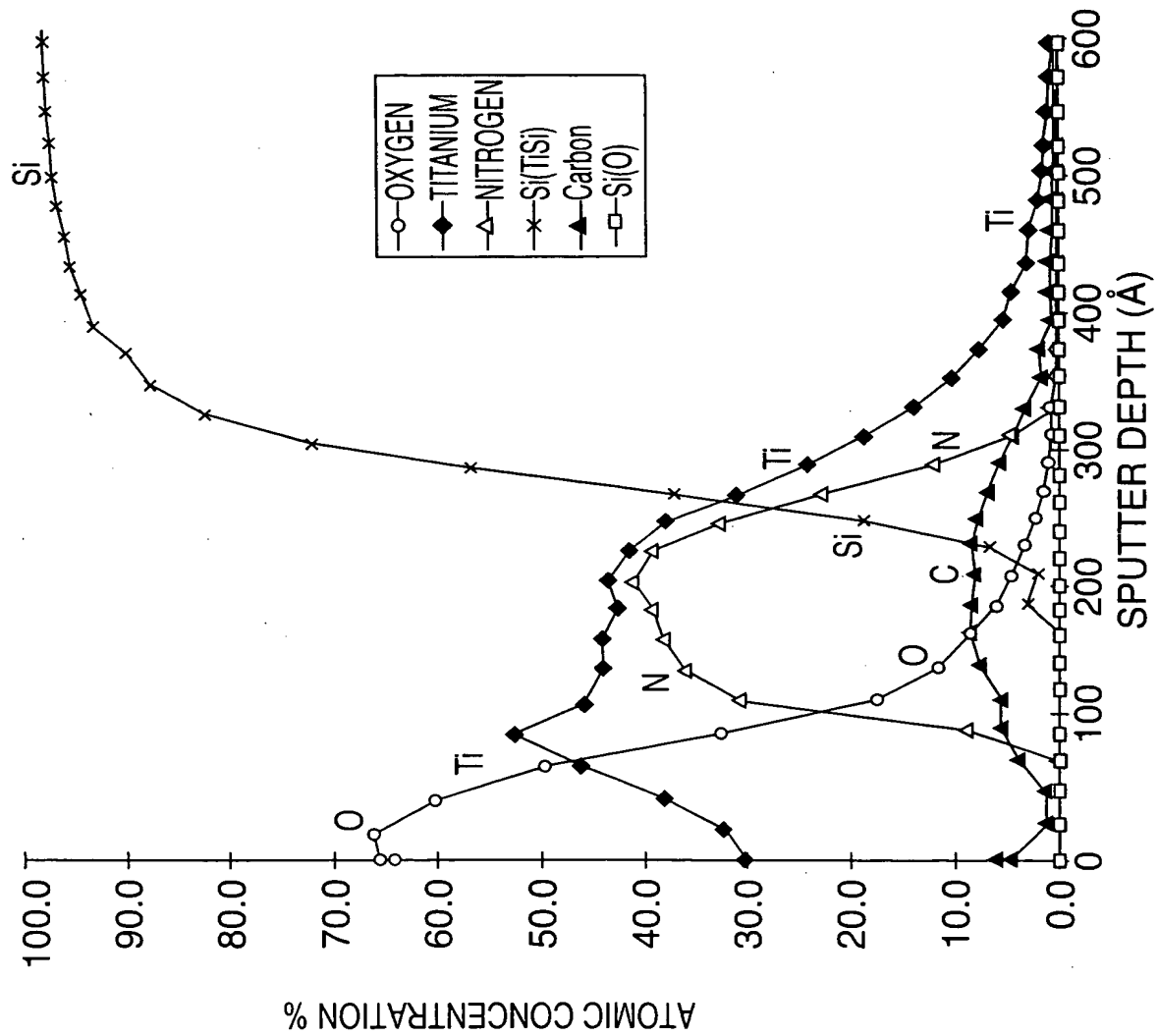


FIG. 43b

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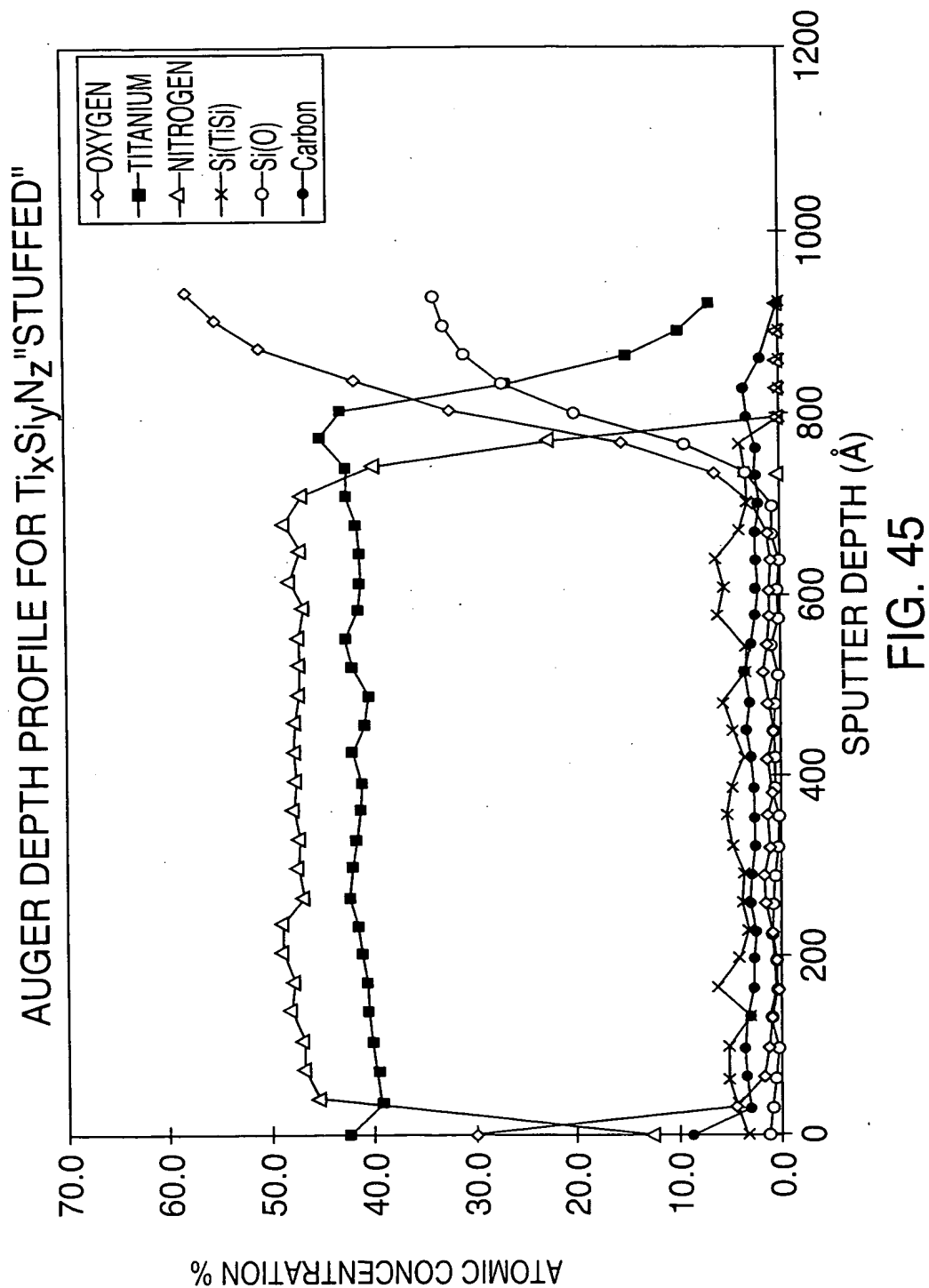
FIG. 44

FILM THICKNESS	SHEET RESISTANCE	SHEET RESISTANCE UNIFORMITY STANDARD DEVIATION	SUBSTRATE DEFECTS
200 Å (NO OXIDATION)	410 Ω/SQ.	2.2%	SEVERE
300 Å (NO OXIDATION)	235 Ω/SQ.	2.0%	SEVERE
200 Å (20 SECONDS OXIDATION)	630 Ω/SQ.	3.7%	MINOR
300 Å (20 SECONDS OXIDATION)	250 Ω/SQ.	2.7%	NONE

FIG. 47

CHARACTERIZATION OF STUFFING VERSUS DEPOSITION					
SAMPLE	RESISTIVITY μΩ -cm	COMPOSITION, ATOMIC PERCENT			
		TITANIUM (Ti)	NITROGEN (N)	SILICON (Si)	HYDROGEN (H)
SILICON STUFFED TiN	~520	35.2	52.8	5	7
DEPOSITED TiSiCN	~2400	25.3	49.7	15	10

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AUGER DEPTH PROFILE FOR  $Ti_xSi_yN_z$  "DEP WITH  $SiH_4$ "

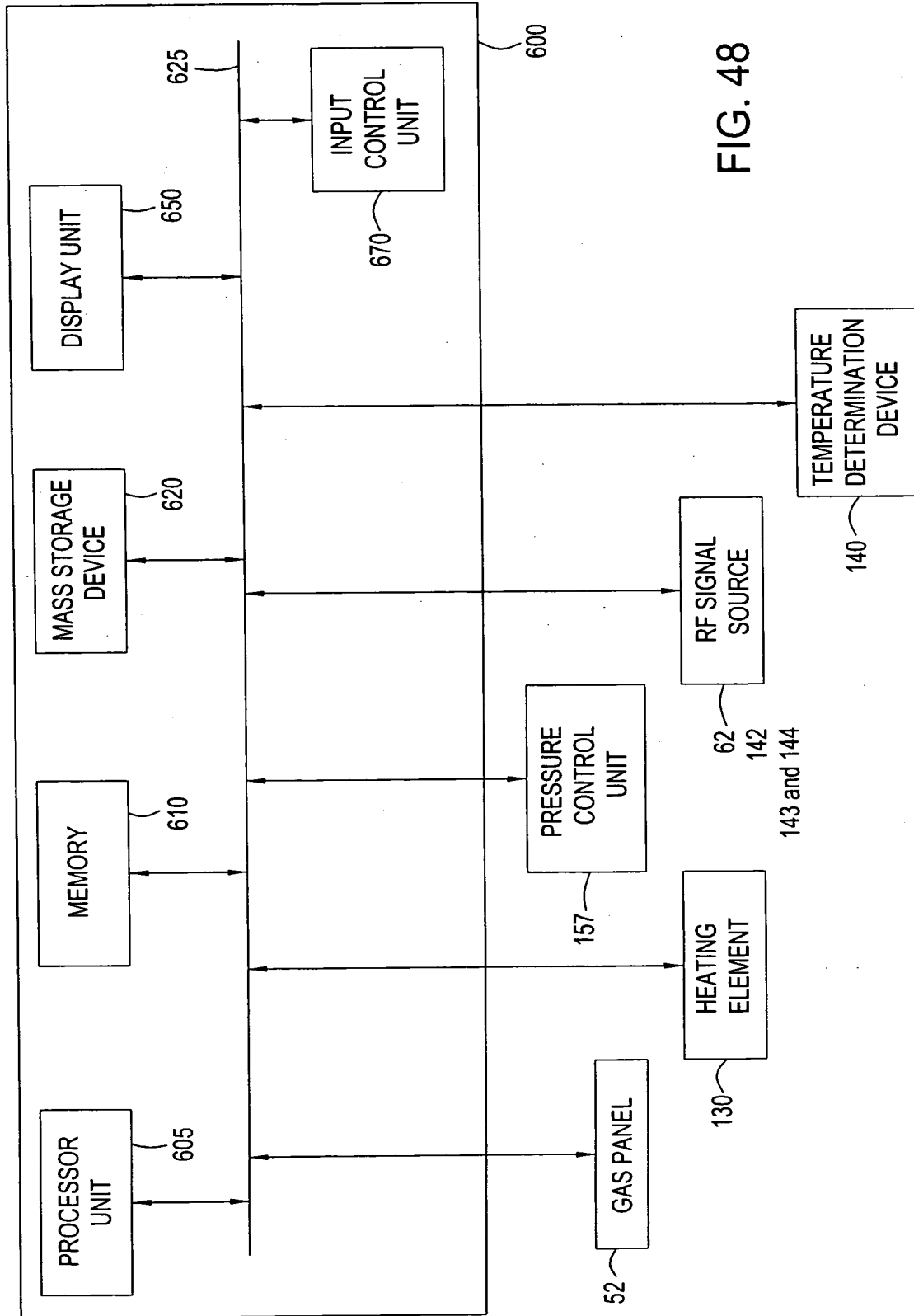
ATOMIC CONCENTRATION %

SPUTTER DEPTH (Å)

Legend:

- ◇— OXYGEN
- TITANIUM
- △— NITROGEN
- ×— Si(TiSi)
- Si(O)
- Carbon

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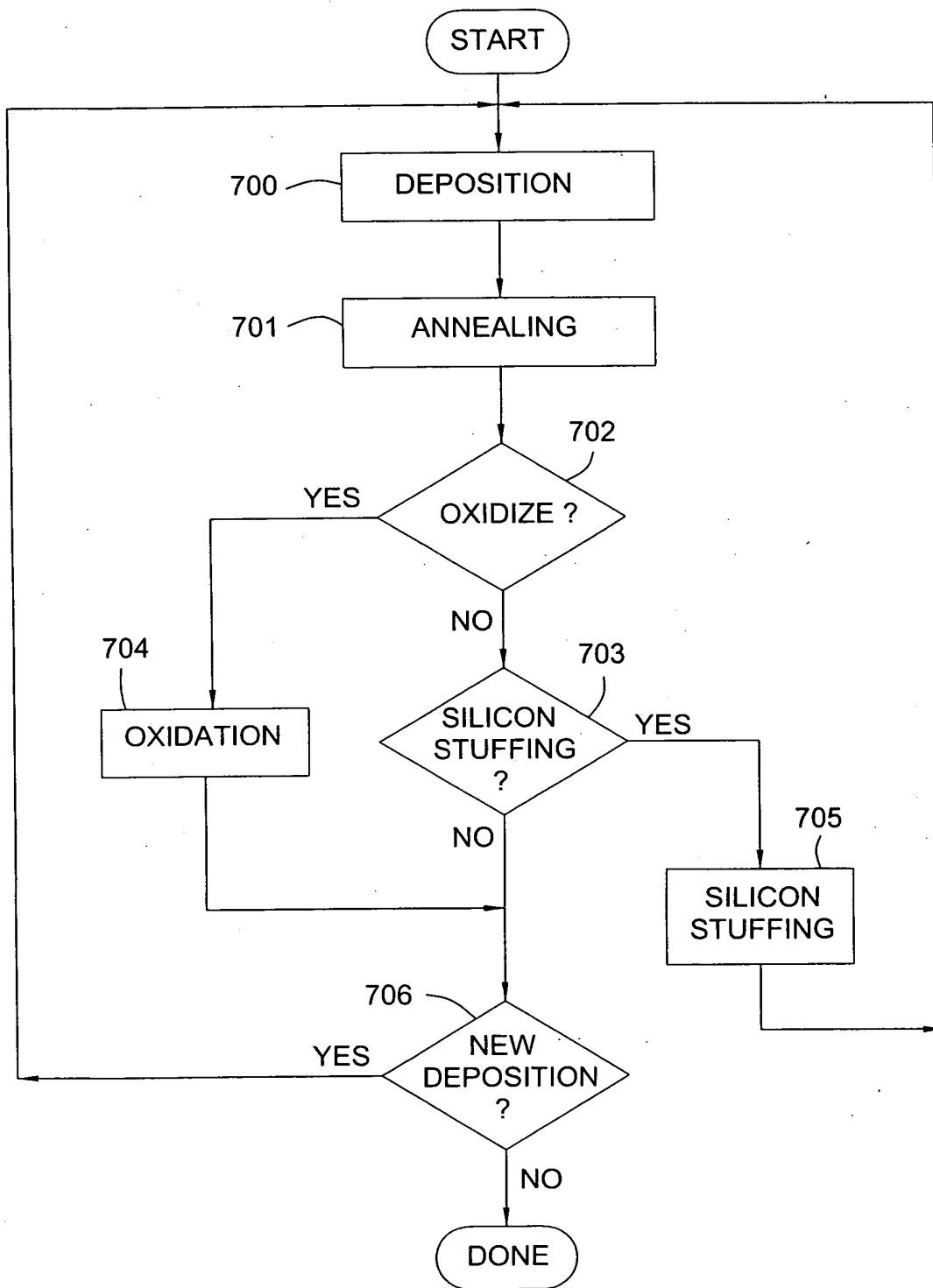


FIG. 49

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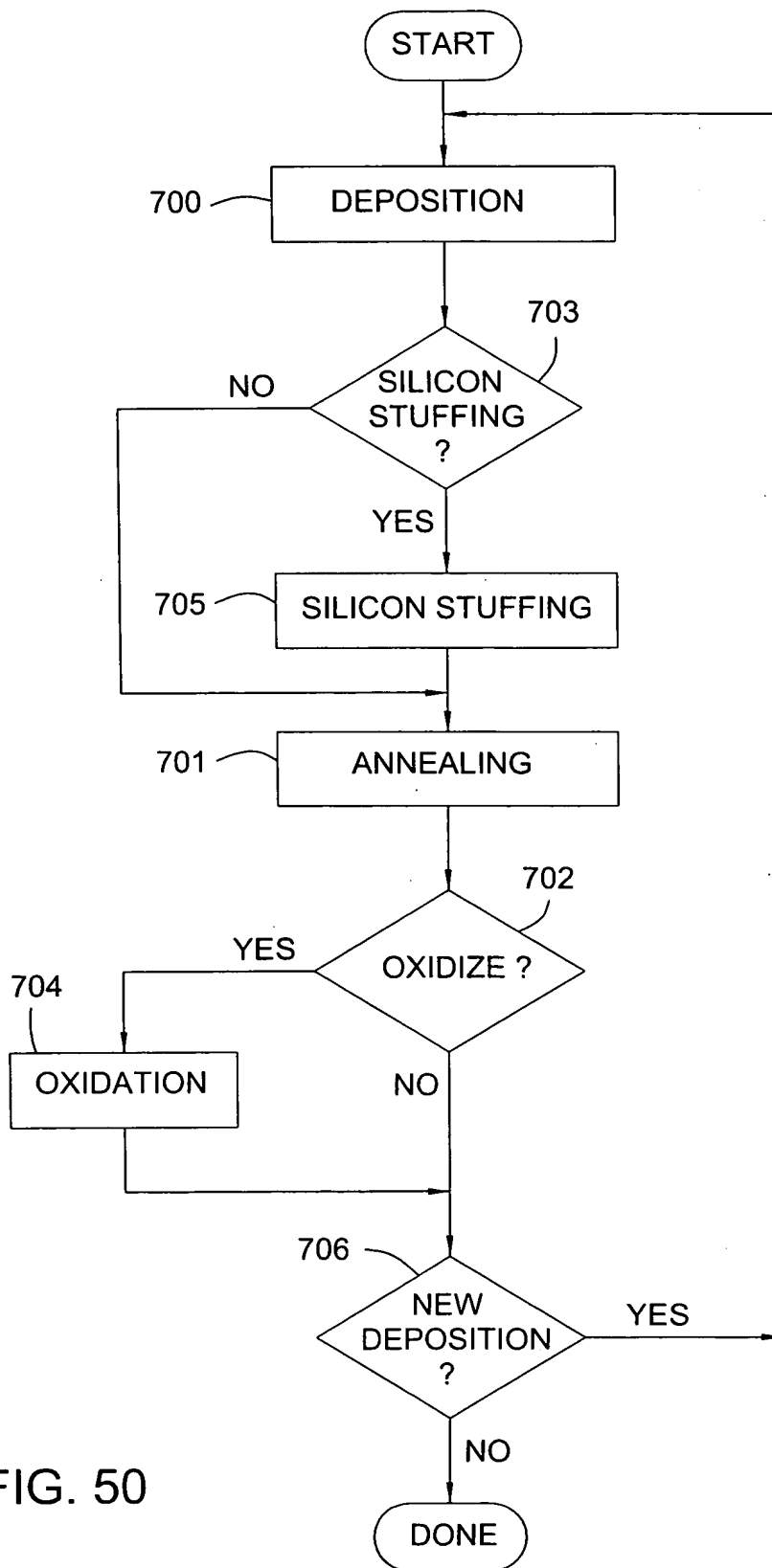


FIG. 50